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ADC

Sound Shaper®

Computer Memory Frequency

Equalizer/Analyzer

SS-325X

Owner's Manual

Features

The ADC model SS-325X combines a microprocessor-controlled 12 band equalizer (EQ), a real-time analyzer (RTA), a pink-noise generator, and a sound pressure-level meter into one unit. (And it comes with a calibrated microphone.)
Twelve rocker type electronic switches control the +12 dB boost or cut response at each of twelve frequency ranges. The center frequencies are arranged in such a way that those at 250 Hz and above are exactly one full octave apart from each other, and below 250 Hz frequencies are only two-thirds of an octave apart. This arrangement gives you increased control of critical low frequency response, making the SS-325X especially useful when used with today's advanced digital equipment.

The other features of the SS-325X include:
- Large flourescent display, dominating the front panel, functions as a frequency equalizer display or as a spectrum analyzer display with the resolution of 2 dB in both modes.
- Separate channel output level display calibrated to 1V at 100 dB.
- LEFT/RIGHT buttons let you choose either the left or right channel, or a composite of both, and view the selected setting both in the EQ or RTA mode.
- SET FLAT button quickly makes the equalizer's band flat.
- Four memory buttons for four custom settings let you recall a pre-equalized response instantly.
- RTA SENS (itivity) control let you adjust the overall height of the RTA display.
- Bidirectional tape dubbing and equalized-response record-ing/dubbing.
- Using pink-noise generator together with clip-type condenser microphone attached, you can adjust with the eye the response of accoustic at the restening room for the equalizer easily.

In the space provided below, record the serial number of your unit, located on the back of the cabinet.

Unit description
COMPUTER MEMORY FREQUENCY EQUALIZER/ANALYZER
Sound Shaper SS-325X

Serial No._____
Retain this number for future reference.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol is intended to alert you of the presence of uninsulated dangerous voltage within the unit's enclosure that may be of sufficient magnitude to con-stitute a risk of electric shock to persons

This symbol is intended to alert you of the presence of important operating and maintenance instructions in the literature accompanying the unit

WARNING

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION: TO PREVENT ELECTRIC SHOCK DO NOT USE THE POLARIZED PLUG WITH AN EX-TENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENTION: POUR PRE-VENIR LES CHOCS ELECTRIQUES NE PAS UTILISER LE FICHE POLARISEE AVEC UN PROLONGA TEUR UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

Installation

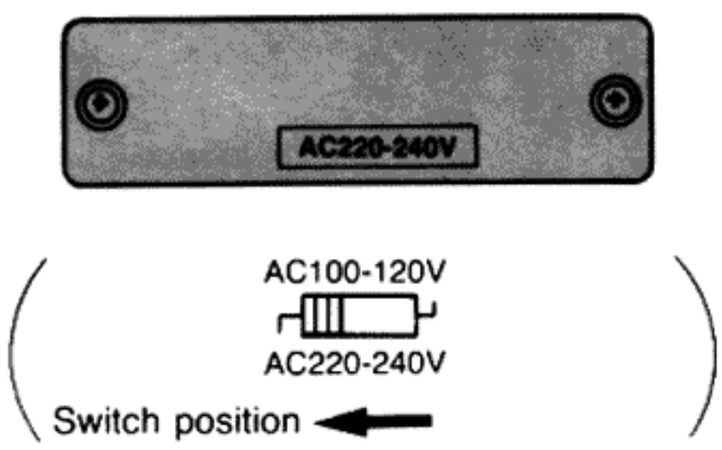
As with other quality sound equipment, adequate ventilation will extend the trouble-free life of your equalizer. You should not install this unit in an overly confined area along with other heat generating equipment.
As for the PX, Japan, USA and Canada version model, an unswitched AC outlet is available on the rear panel of your unit for connecting other sound equipment accessories and is limited to 200W maximum.
Connect the line cord to an AC outlet providing the proper AC voltage. The power consumed is 25W and if available, the switched accessory outlet of your amplifier may be used to turn the unit on or off with your sound system's main power switch.

Voltage conversion (PX version only)

The voltage selector is provided for PX version only.

■ This unit is factory-set to the voltages as below.

FOR **220V-240V** AREA

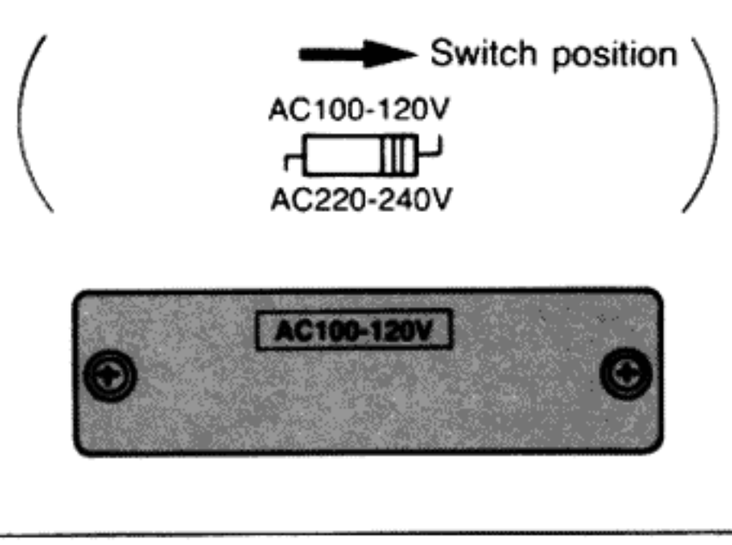


■ If your wall outlet supplies AC 100 to 120V, refer to the following and reset the switch.

FOR **100V-120V** AREA

If you ever need to change the voltage setting, first ensure the unit is unplugged from the power outlet and refer to the following:

1. Unscrew the small voltage cover plate near the AC cord.
2. Move the switch with a small screwdriver.
3. Turn the plate upside-down (180-degree, in other words, which exposes the switch in new voltage position) and screw it back on. Don't turn the plate over.



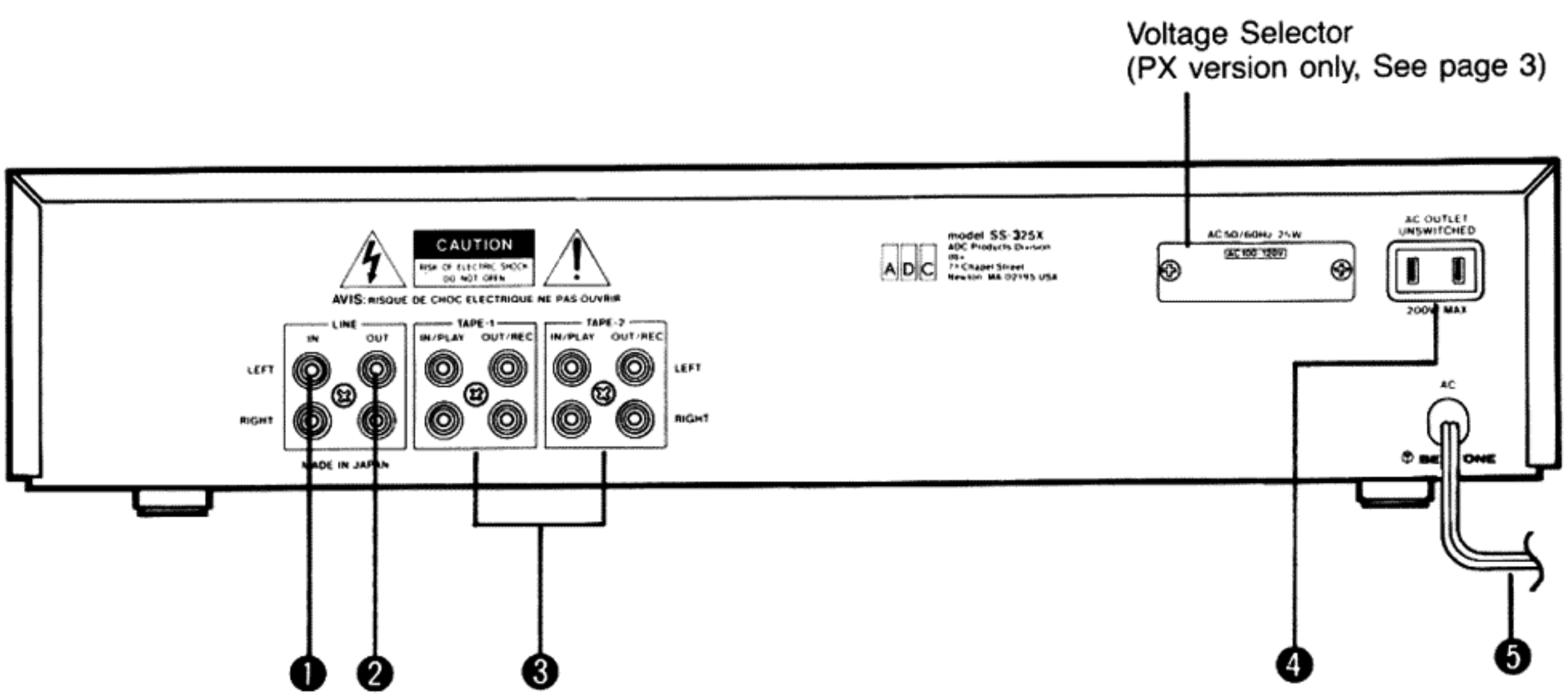
Important .... Before Operating the Equalizer

All equalizers are designed for 'unity gain', in other words, the level of signal output is the same as the level of signal input **when all frequency bands are set to 0 (FLAT).**
If one or several frequency bands are boosted in either or both channels (stereo), the output level from your equalizer will increase within the range of frequencies affected by those controls, thereby increasing the sound level or power output of your amplifier. Depending on the master volume control setting, this can result in over-driving of the power amplifier and/or speaker system and incurring possible damage.
It is suggested that you reduce the master volume control setting of your sound system before switching the equalizer in or out of the system and then restore the master volume control setting to your listening preference.
Do not use the equalizer to increase volume, it is not an amplifier, it is designed to tailor the frequency response of your system, either to your personal preference or help correct deficiencies of the sound system or room acoustics.

Connections

Turn your system off and the volume all the way down. "Preamp" stands for your preamplifier, receiver, or integrated amplifier.

The SS-325X has its own tape monitor loops to replace the ones it occupies.



❶ LINE IN jack
These jacks receive the signal from your preamp. Connect your preamp's "Tape Out*" to these inputs.

❷ LINE OUT jack
These are the outputs of the equalizer circuitry. Connect these jacks to your preamp's "Tape In*".

* Note that with some components, "Tape Out" is called "Tape Rec" and "Tape In" is called "Tape Play" or "Tape Monitor," and there are other variations.

❸ TAPE-1/TAPE-2 (IN/PLAY and OUT/REC) jacks
This, of course, is where you connect your cassette deck(s) and/or your reel-to-reel recorder(s). The hookup is simple. Connect the SS-325X's TAPE (1 or 2) OUT/REC jacks to the INPUT on your deck, and return its OUTPUT to the SS-325X's TAPE IN/PLAY (same loop number as going out, naturally).

❹ AC OUTLET UNSWITCHED (200W MAX) (Except: Europe version)
The AC OUTLET receptacle may be used to power the one of associated equipment regardless of the POWER button. Plug the power plug from the associated equipment into this receptacle.
Important! Do not plug in any equipment with the rated power consumption greater than 200W.

❺ Power cord
Connect this cable to the appropriate power source. If another piece of equipment has a switched outlet (your preamp, for instance), that's one good place to plug in.
Warning: Be sure to remove the power cord from the AC outlet before changing the setting.

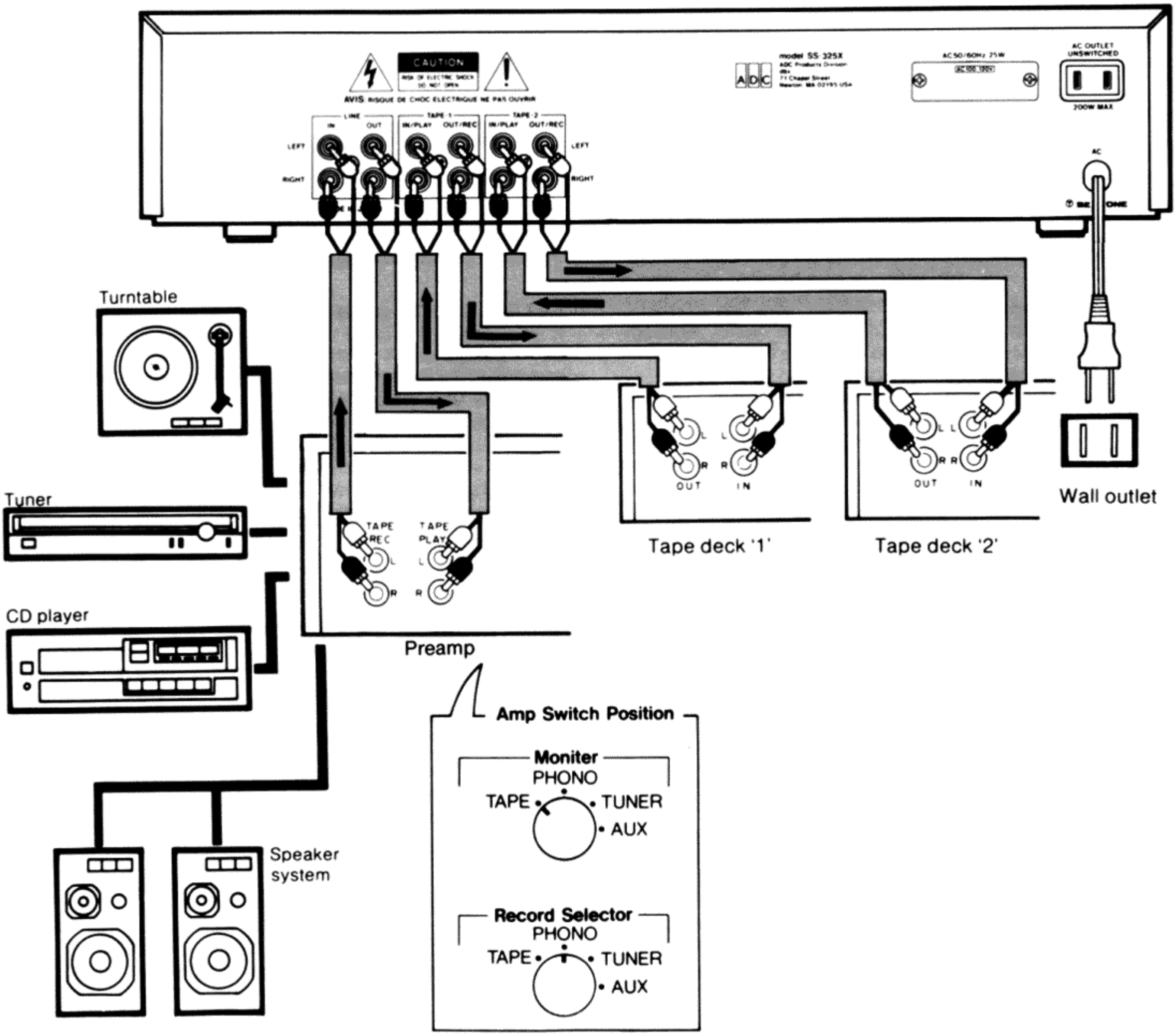
Typical Hookup

The SS-325X goes in the preamp's tape monitor loop, as shown. The tape deck(s) then go in the SS-325X's tape loops.

Power requirements
Power requirements for electrical equipment differ from area to area.

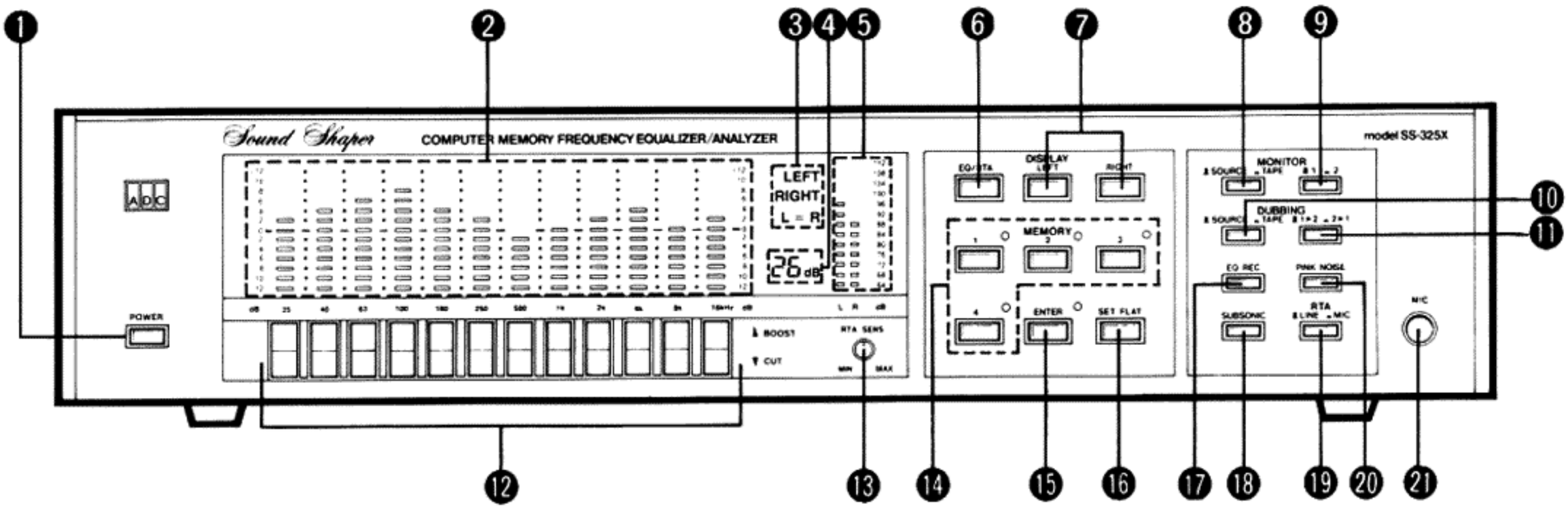
Please ensure that your unit meets the power requirements in your area.
If in doubt, consult a qualified electrician.

100V, 50/60 Hz for Japan
120V, 60 Hz for U.S.A. and Canada
220V, 50 Hz for Europe except U.K.
240V, 50 Hz for U.K. and Australia



** The SS-325X is connected to TAPE terminals of a preamp. To play or record through the equalizer, set the amp's MONITOR switch to TAPE and the RECORD switch to the desired program source (PHONO, for instance).*

Controls and functions



❶ POWER button
Depress to turn the unit on or off. The "ADC" emblem above the button is illuminated when the unit is on.

❷ Frequency response display
A fluorescent display consisting of bar or bar-graph indicators numbered in 2 dB resolution. In the EQ mode, it shows the equalization curve by means of twelve bars; in the RTA mode, it shows the frequency content of the program by twelve rising and falling bar-graphs as a spectrum analyzer. Without any other operations, the highest dots of each bars are fixed in a few seconds so that you can see the peak level. After their droping, you can see the peak level again. This movements is repetitions one.

❸ Channel indicator
Indicates the channel of the equalizer or analyzer. The L = R indicator lights when the equalization curves for left and right channels are identical.

❹ Sensitivity indicators
In the RTA mode, this indicates 26 dB (RTA Dinamic Range). In the EQ mode, this indicates 0 dB.

❺ Output level L/R indicators
When the LINE/MIC button is set to LINE, bar-graph indicators show the output level of each channel, with 100 dB equaling 1V (rms). When the LINE/MIC button is set to MIC, the signal from the microphone is indicated on the left channel output indicator only.

❻ EQ/RTA button
Pressing this button selects the RTA mode or EQ mode. When this button is operated for the RTA mode, the indicator shows the frequency spectrum by the bar-graph indicators. When this button is operated for the EQ mode, the indicator shows the EQ curve by the twelve bars. The equalizer adjustment can be made during the RTA mode.

❼ LEFT/RIGHT buttons
If you press the LEFT button, the display shows the equalization curve or frequency spectrum of the left channel (the LEFT indicator in the upper-right corner also lights). If you press the RIGHT button, it's the right channel equalization curve or frequency spectrum of the right channel (the RIGHT indicator lights). Pressing both buttons at a time (lighting the both LEFT and RIGHT indicators) shows the average of the two curves or the average spectrum of both channels. This doesn't affect the actual equalization on each channel. (When the equalization curves for the left and right channels are identical, the L = R indicator lights.)

❽ MONITOR SOURCE/TAPE button
This button selects the source signal or output of the tape decks for monitoring. Set this button to SOURCE to listen to the LINE inputs (preamp output — tuner, phono, CD, etc.). Set this to TAPE to listen to the tape decks selected by the MONITOR TAPE1/TAPE2 button.

❾ MONITOR TAPE1/TAPE2 button
This button selects the output of either of two tape decks connected to TAPE1 or TAPE2 jacks on the rear panel when the MONITOR SOURCE/TAPE is pressed (TAPE).

❿ DUBBING SOURCE/TAPE button
This button is used to dub (copy) a tape program onto the other tape deck. Set this switch to the SOURCE position when recording the LINE inputs (preamp output, tuner, phono, CD, etc.) on the tape deck(s). Set this button to TAPE to dub from one tape deck to the other. The direction of dubbing is selected by the DUBBING 1 ► 2 2 ► 1 button. To make an equalized dubbing, the EQ REC button must be depressed.

⓫ DUBBING 1 ► 2 2 ► 1 button
This button selects the direction of dubbing. When this button is released, dubbing is made from TAPE1 deck to TAPE2 deck. Press this button to dub in reverse direction.

⓬ Equalization BOOST/CUT switches
Each of these electronic rocker switches increases or decreases the amplitude of its frequency band ±12 dB in 2 dB steps. When either the LEFT or RIGHT indicator is on, they affect only that channel; when both are on, they affect both channels.

⓭ RTA Sensitivity MIN/MAX control
This control knob is worked for adjustment of RTA Display Sensitivity. Turning to right, its Sensitivity is moved up. In accordance with the scale of input signal, this SS-325X is to be adjusted for the spectrum to be seen at the center and its neighborhood on the display.

⓮ MEMORY/1-4 buttons/indicators
Each button stores and recalls a stereo pair of equalization curves. The curve for each channel may or may not be identical with the other. The red indicator lights up at pressing of the corresponding button.

⓯ ENTER button/indicator
This allows you to store any displayed curve in memory. Once the desired curve is produced by the frequency BOOST/CUT switches, press the ENTER button and one of the MEMORY buttons (1-4) where you want the curve stored. Any previous curve stored in that location will be erased.

⓰ SET FLAT button
This button resets the equalizer's bands (of both left and right channels at a time) to their center (0 dB) positions so the signals are unequalized. Pressing it doesn't affect any equalization curves actually stored in the MEMORY/1-4 buttons.

⓱ EQ REC button
This button is pressed to make an equalized tape recording or dubbing. While the EQ REC button is pressed, the equalizer doesn't affect monitor output.

⓲ SUBSONIC button
This button is used to switch in the subsonic filter which functions to attenuate the low frequencies below 15 Hz by −18 dB/octave and to eliminate low frequency hum or turntable rumble.

⓳ LINE/MIC button
To make an analyzer measurement of the signal from the microphone, set this button to MIC position (▂). When the button is set to LINE position (■), the analyzer measurements are made from the LINE input on the channel selected by the LEFT/RIGHT buttons.

⓴ PINK NOISE button
Press this button (while the MONITOR SOURCE/TAPE switch is set to SOURCE) and pink noise will go out from the LINE OUT jacks. The channel on which the pink noise is fed is determined by the LEFT/RIGHT buttons. Pink noise offers a constant frequency spectrum of noise.

㉑ MICrophone jack
Connect the microphone supplied only.
Caution: Use the supplied microphone. The use of other microphones (dynamic type etc.) will damage your system. (Never connect a headphone here!)

Using the Equalizer(EQ)

❶ Note that in order for your equalizer to be in operation — that is, in the signal path — the signal always has to be going to and from it. In other words, if you've connected the equalizer in the "Tape1" loop, leave the preamp set to monitor "Tape1." If your preamp is one of those that have separate input selector and "Rec Out" switches, leave the input selector knob or whatever on "Tape1" and choose the program source with the "Rec Out" knob.

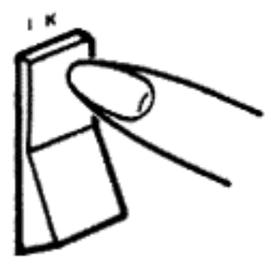
❷ Confirm pink noise is off and set the MONITOR buttons to the position which you wish to listen to. Press the MONITOR SOURCE/TAPE button to listen to a tape program and select Tape1 deck or Tape2 with the MONITOR TAPE1/TAPE2.

❸ Using the EQ/RTA button and LEFT/RIGHT buttons
Press the EQ/RTA button for the EQ mode (The sensitivity indicator shows "0 dB").
To adjust the equalization applied to the left channel, press LEFT. You can view the left channel equalization curve on the display. To adjust the equalization applied to the right channel, press RIGHT. You can view the right channel equalization curve on the display. To adjust the left and right channels simultaneously, press LEFT and RIGHT at a time. You can view the average of the two curves on the display. (This doesn't affect the actual equalization curve.)
When the equalization curves for left and right channels are identical, the L = R indicator also lights.

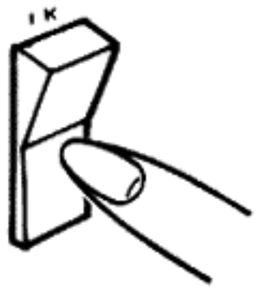
❹ Press the SET FLAT button.

❺ Equalizer adjustment
The 12 electronic rocker switches permit the individual adjustment of each octave. Pressing upper part of them increases level; pressing lower part decreases level.

To increase level



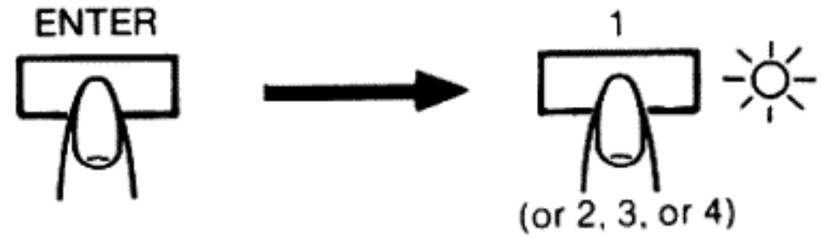
To decrease level



Their action accelerates as they are held. Of course, more than one switch may be pressed at a time. You can correlate what you see with that you hear; you will want to experiment with the different switches to remind your ear what the various frequencies actually sound like (but be careful with the volume). You can become a better-educated listener (and judge of speakers). Where is most so-called low bass? (Around 63 Hz-adds oomph. Boosting 25 Hz seldom does much.) "Thickness"? (100, 160 and 250 Hz — boomy, too. The 250 Hz area correlates also with "colored", "hollow" — but with a thump.) "Honkiness", "nasality"? (500-1k-2 kHz. The general sound is of congestion, but as you go higher, the sound assumes a "telephony" quality, too.) "Brightness"? (4 kHz. Don't forget that the ear is most sensitive in the 1-3 kHz area). "Air"? (8 kHz — also scrathy, sometimes spitty). The 16 kHz band fully increased can add sparkle, and fully decreased make a strong and effective scratch/hiss filter for some sources. The SET FLAT button returns any new setting to flat.

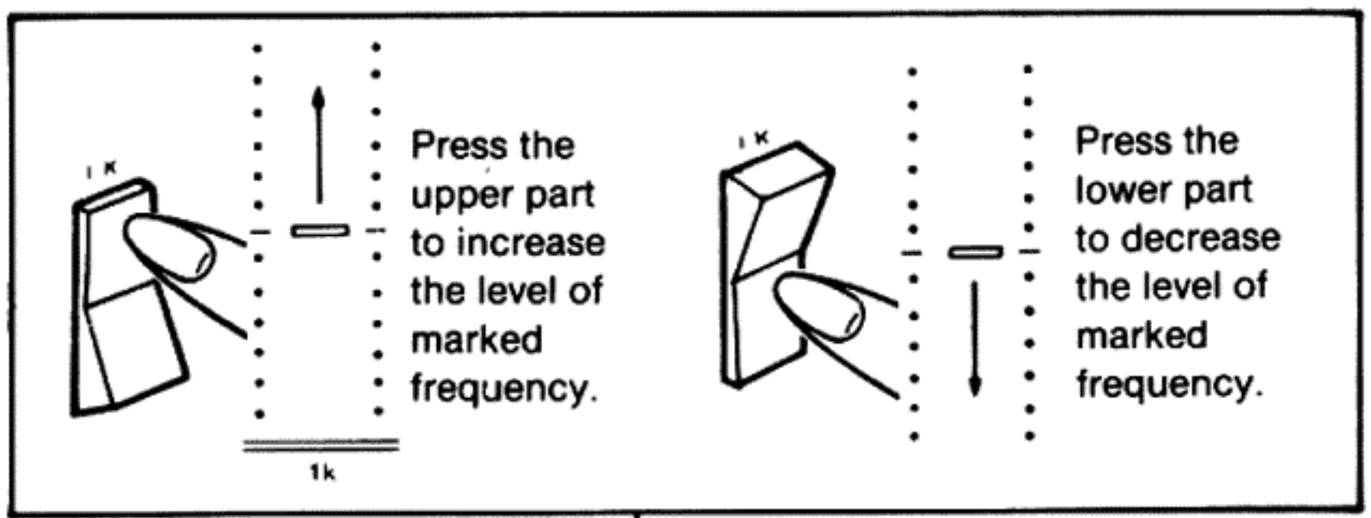
Separate channel equalization vs. simultaneous channel equalization
Studies show that it is this total power response, reflections included, which is most influential in our perception of spectral (tonal) balance. However, localization is determined primarily by direct sound. Equalizing two channels of a stereo system differently, therefore, can adversely affect stereo imaging. So for most cases where speakers are similarly loaded into the room (symmetrical environments etc.), we recommend using the SS-325X to apply the same curve to both speakers, by pressing the LEFT/RIGHT buttons at a time (lighting LEFT and RIGHT indicators) and by adjusting the EQ curve until the L = R indicator lights. For different environments and/or different speakers in a pair, you probably will want to do them separately, by pressing either the LEFT or RIGHT button, lighting the corresponding indicator.

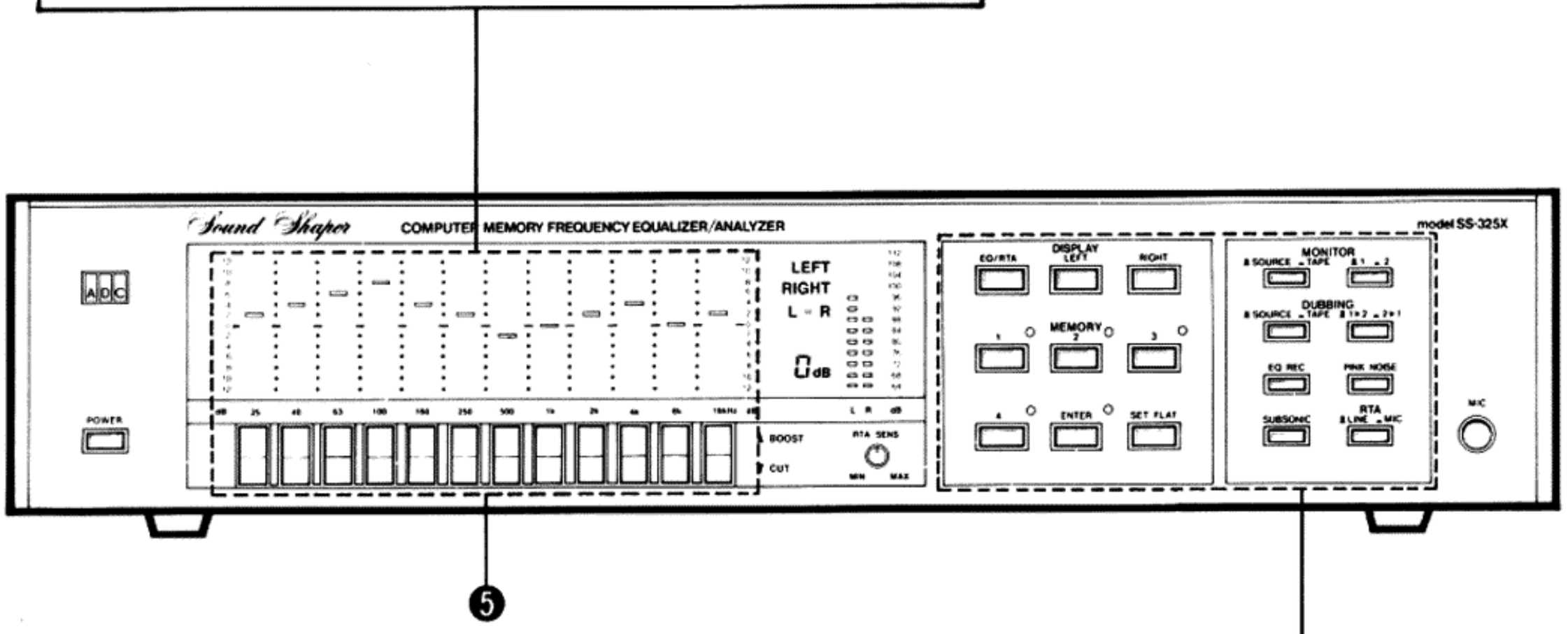
❻ Entering curves into memory
Once you have a desired curve by adjusting the equalization BOOST/CUT switches, press the ENTER and one of the MEMORY buttons(1-4), where you want the curve to be located. Whichever MEMORY you choose for the new curve will have its old curve erased, of course. Comparisons among curves or between a curve and no equalization (SET FLAT) are simple and instantaneous.



If you desire, you can change the left or right channel equalization only of a stored curve pair. e.g. To change the right channel curve to a new curve, press RIGHT (lighting the RIGHT indicator in the display). Set a new equalization curve. Press ENTER. Press the MEMORY/1 button (lighting the 1 indicator). Now the right channel curve has been changed to new one while allowing the left channel curve remaining the same.

Using Equalizer, memory is backed-up by the lithium battery put in this SS-325X.
1 The life of lithium battery is normally 5 years long after you have in hand.
2 You can judge that the lithium battery has not power enough to back-up memory when the stored memory is not put out properly.
3 When back-up system is not workable due to exhaust of battery, you can ask to the shop you bought this SS-325X or the service department listed on ADC/BSR AUTHORIZED SERVICE CENTER (By State).


Press the upper part to increase the level of marked frequency.
1k
Press the lower part to decrease the level of marked frequency.


Sound Shaper
COMPUTER MEMORY FREQUENCY EQUALIZER/ANALYZER
model SS-325X
LEFT
RIGHT
L = R
0dB
BOOST
CUT
RTA SENS
MIN
MAX
POWER
EQ/RTA
DISPLAY
LEFT
RIGHT
MEMORY
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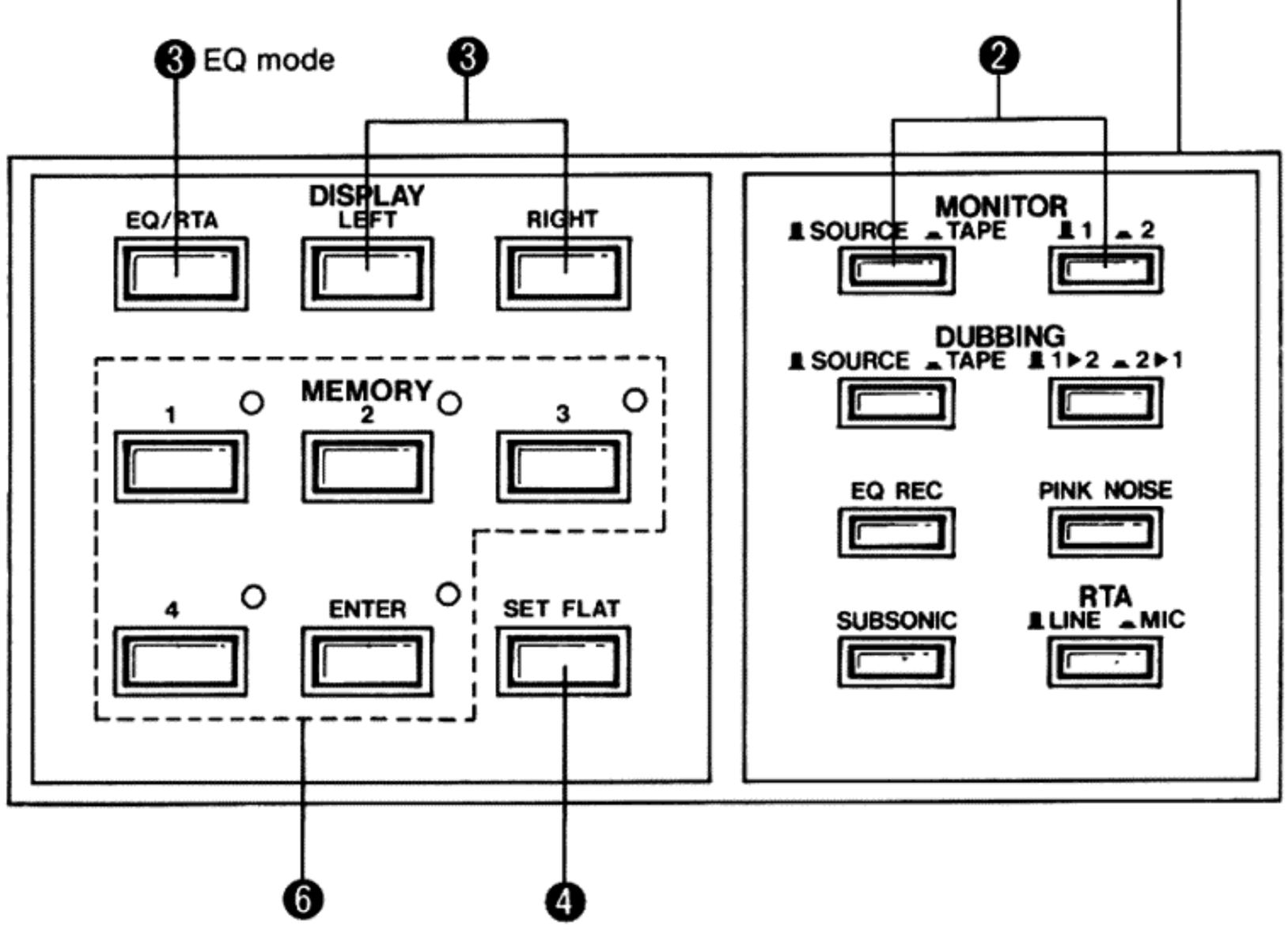
3 EQ mode
3
2
DISPLAY
EQ/RTA
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EQ REC
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RTA
LINE
MIC
SUBSONIC
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4

Using the Real-Time Analyzer(RTA)

Real-time analysis of LINE inputs

To analyze the program from the preamp, etc., turn the program up to a comfortable listening level.

❶ Set the EQ/RTA button for the RTA mode (the sensitivity indicator shows 26 dB). To make an analysis on the mixed channels press the LEFT and RIGHT buttons simultaneously (lighting both LEFT and RIGHT indicator). The equalizer adjustment can be made during the RTA mode.

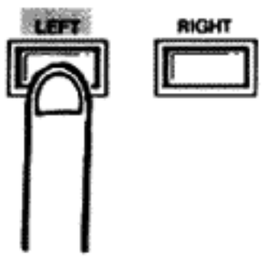
❷ Set the LINE/MIC button to LINE.

❸ Operate the RTA SENS control to roughly center the display.

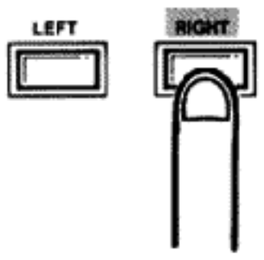
About Peak Hold Functions

✻ Without any other operations, the highest dots of each bars are fixed in a few seconds so that you can see the peak level. After their droping, you can see the peak level again. This movements is repetitions one.

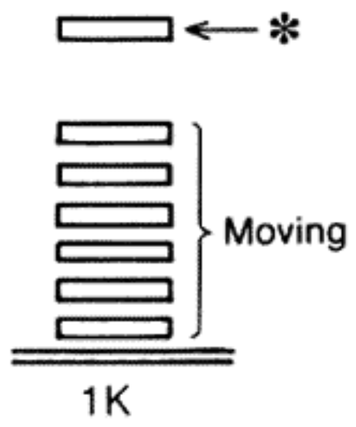
Left channel

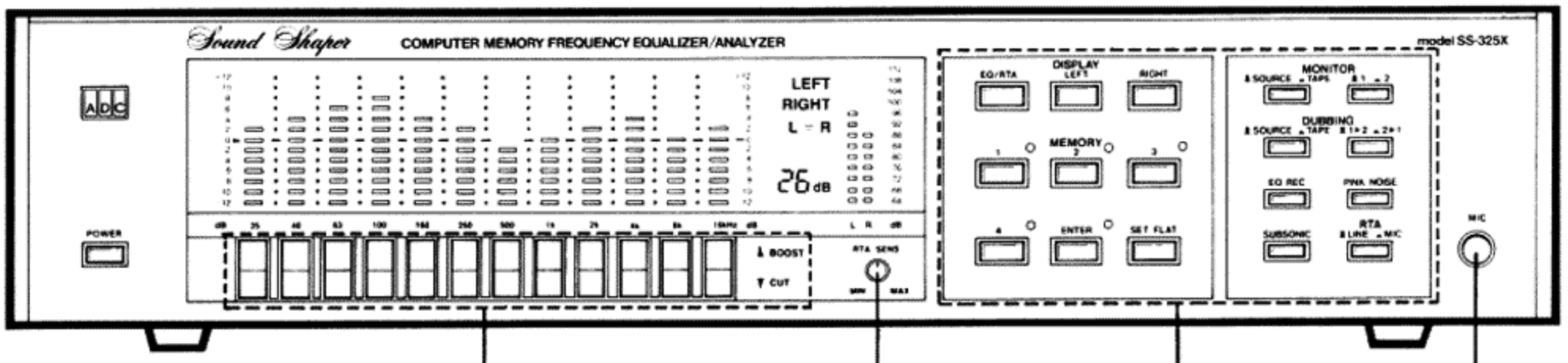


Right channel



Mixed channel

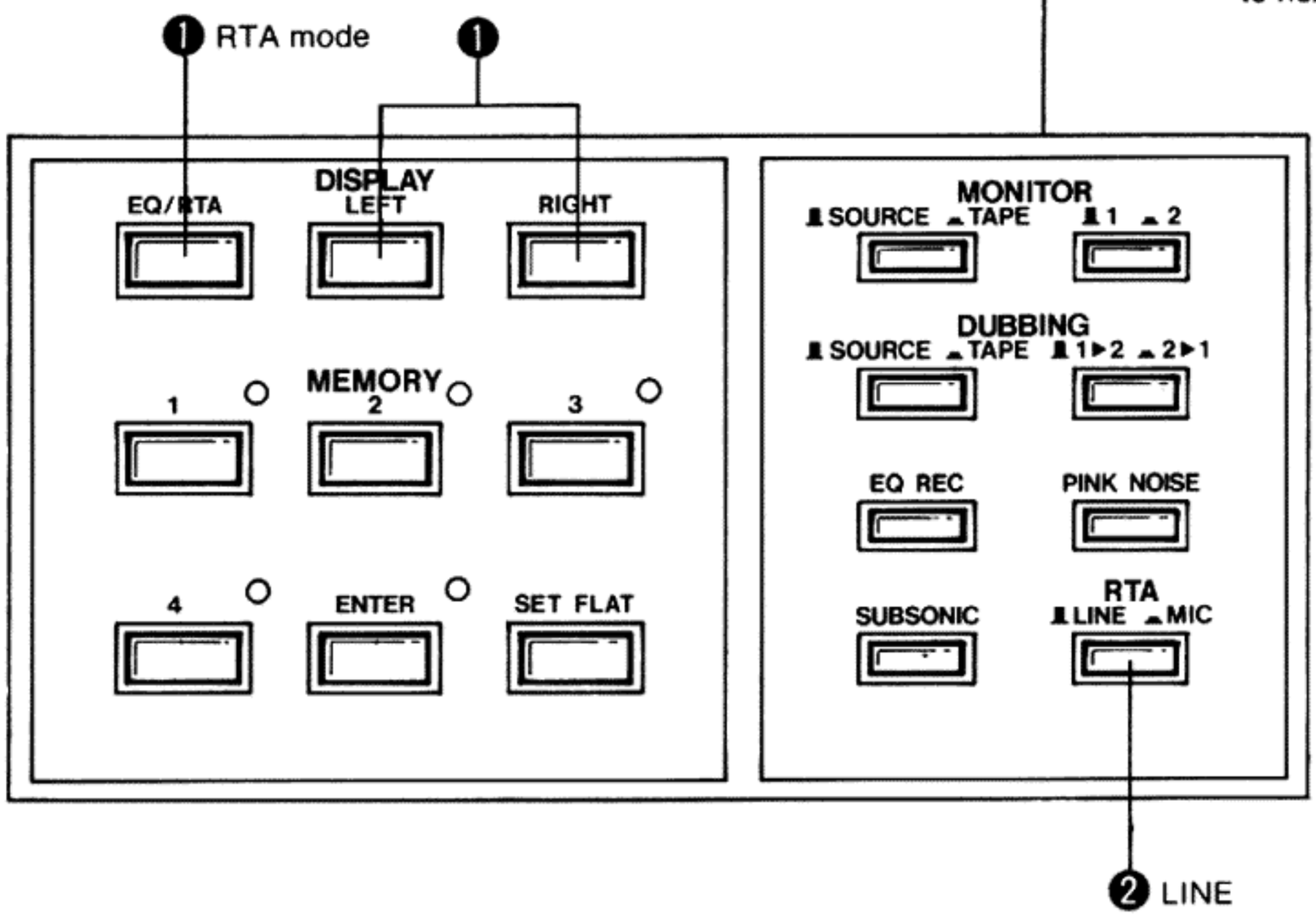




The equalizer adjustment is possible during the RTA mode.

❸

Plug the microphone to analyze the program as it is played in the instening room. (Refer to next page.)

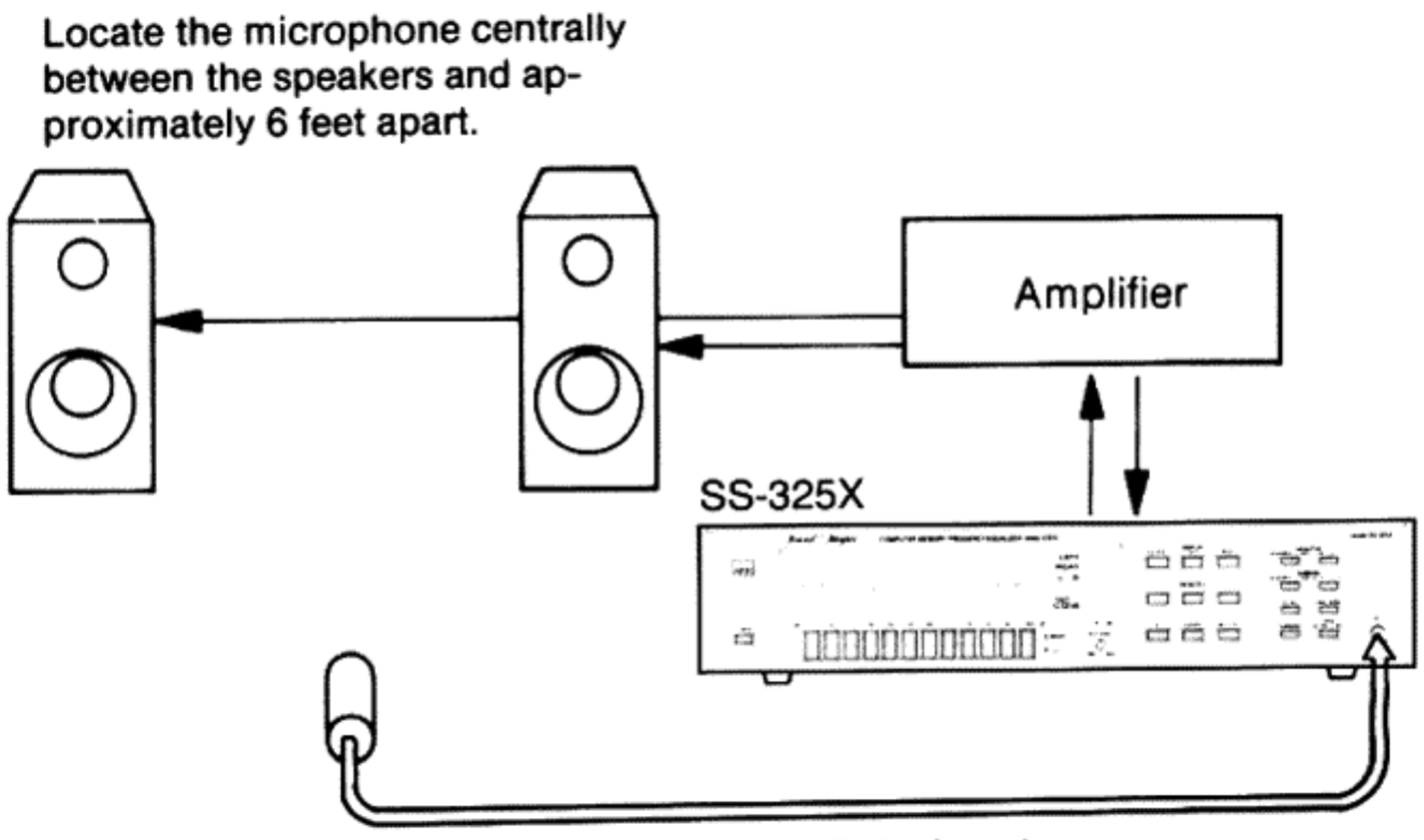


To analyze the program in the listening room

❶ Plug the microphone into the MIC jack. The microphone should be placed at a convenient location in the room. For the most accurate measurement of frequency response, the microphone should be placed in a typical listening location, and the grille should be aimed at a point midway between the two loudspeakers.

❷ Set the LINE/MIC button to MIC position (▬).

❸ Refer to step 3 of "Real-time analysis of LINE inputs", on page 10.
Note: The equalizer adjustment can be made during the RTA mode. (The output indicator displays the left channel only. The channel to observe is selected by the LEFT/RIGHT button.)



To Listen to TAPE or SOURCE Programs

1 To listen to the LINE input sources, first select the program — phono, tuner, etc. — on your stereo system.

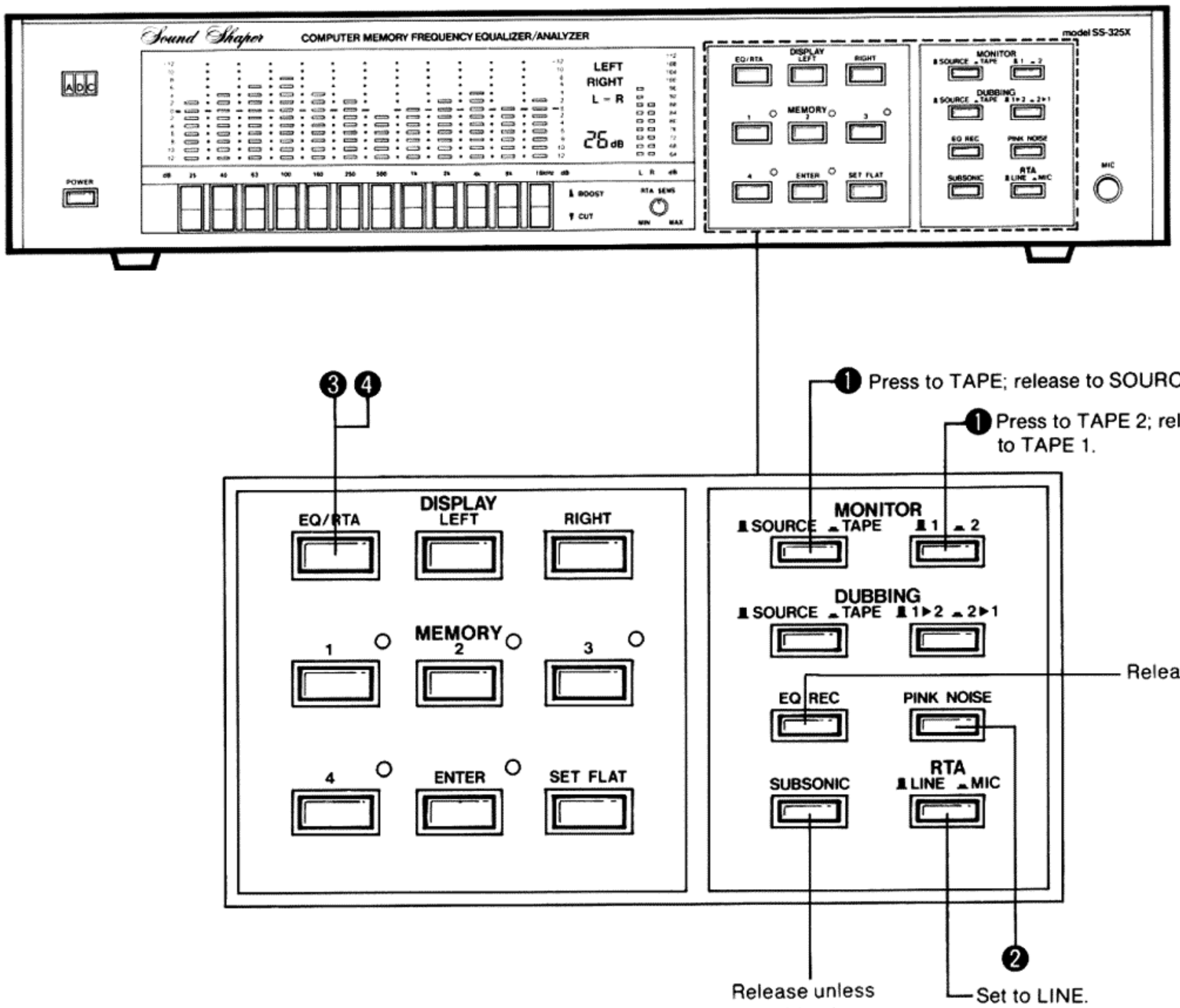
2 Before starting to use the equalizer, set the tape monitor switch of the preamp to on and set the loudness switch and low/high frequency filters (if any) to off.
Note: If your preamp is equipped with a REC OUT selector, first set the input selector on the preamp to the tape (monitor) position, and set the REC OUT selector to the position which selects the program source you desire to make an equalization.

❶ To listen to the SOURCE programs, set the MONITOR SOURCE/TAPE switch to SOURCE; to listen to the TAPE programs, set the switch to TAPE.

❷ Make sure the pink noise is off.

❸ To analyze, press the EQ/RTA button for the RTA mode (the sensitivity indicator shows 26 dB. Refer to page 10.

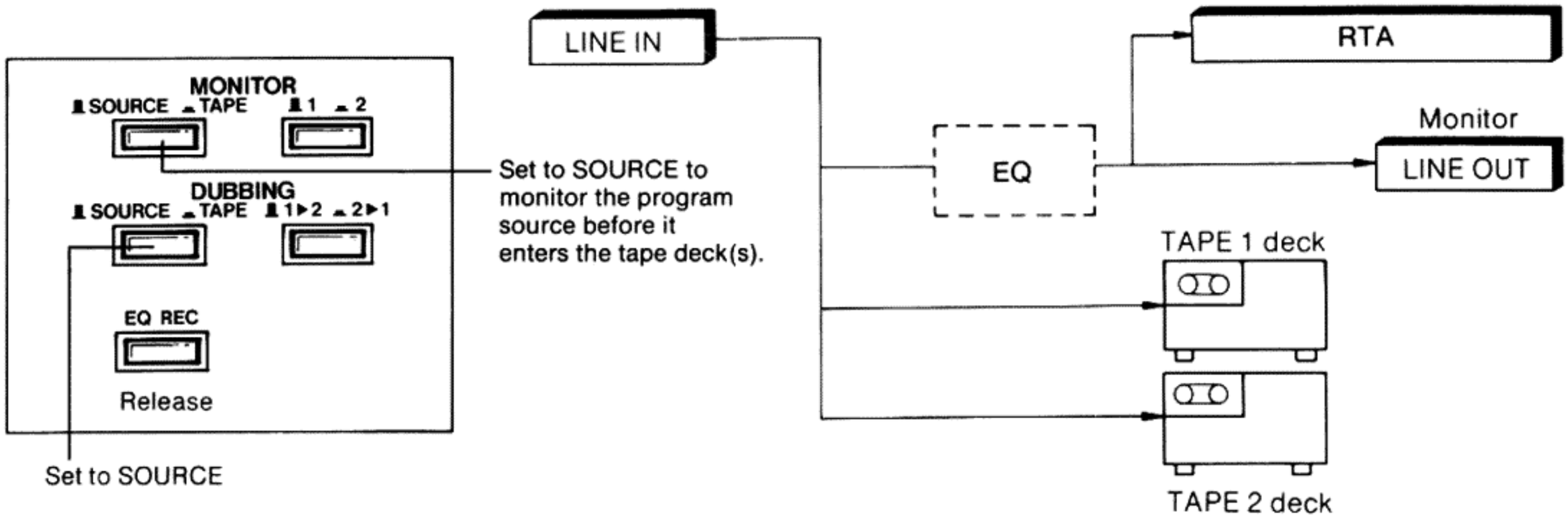
❹ To equalize, press the EQ/RTA button for the EQ mode (The sensitivity indicator shows 0 dB). Refer to page 8.



To Record the LINE Inputs on Tape Decks

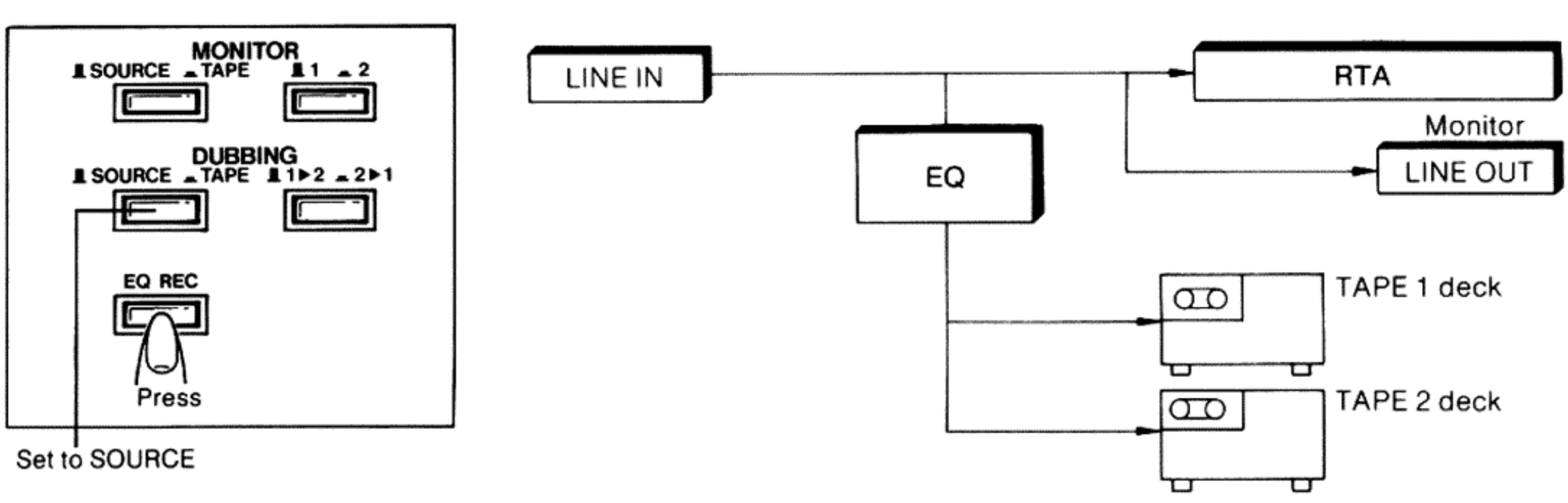
Since the REC output jacks of the TAPE1 and TAPE2 will provide the same recording signal simultaneously, you can set both the TAPE1 and TAPE2 decks to recording mode for a simultaneous recording.

To make a normal recording



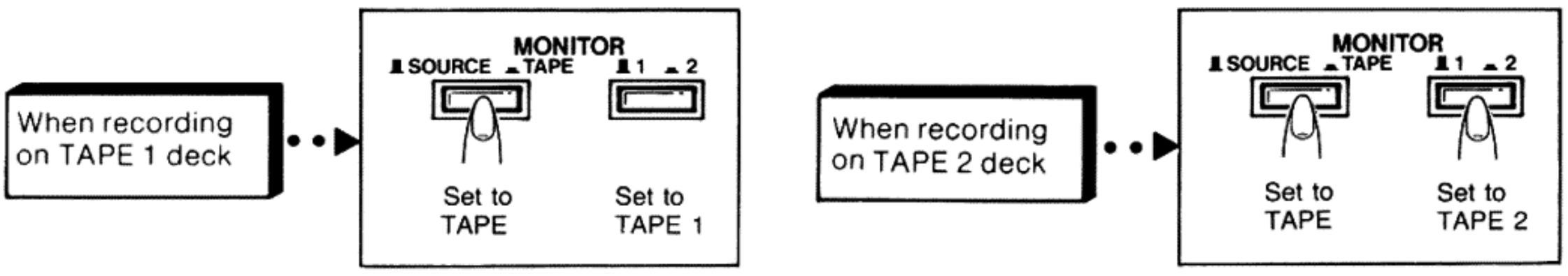
Note: To use the spectrum analyzer as a level meter during recording, the LINE/MIC button should be set to LINE.

To make an equalized recording



Monitoring the recording

If the tape deck employs independent record and playback heads, a true tape monitoring will be possible. This will enable you to hear the program actually on the tape a fraction of a second after you have recorded it.



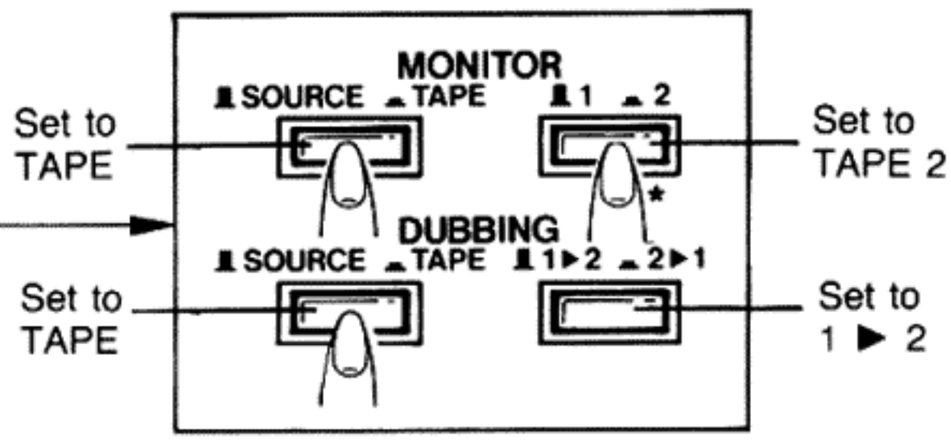
In the SOURCE position, you can monitor the program before it enters the tape deck. The effect of the equalizer will not be monitored.

Note: Switching these buttons during recording may cause pop noise.

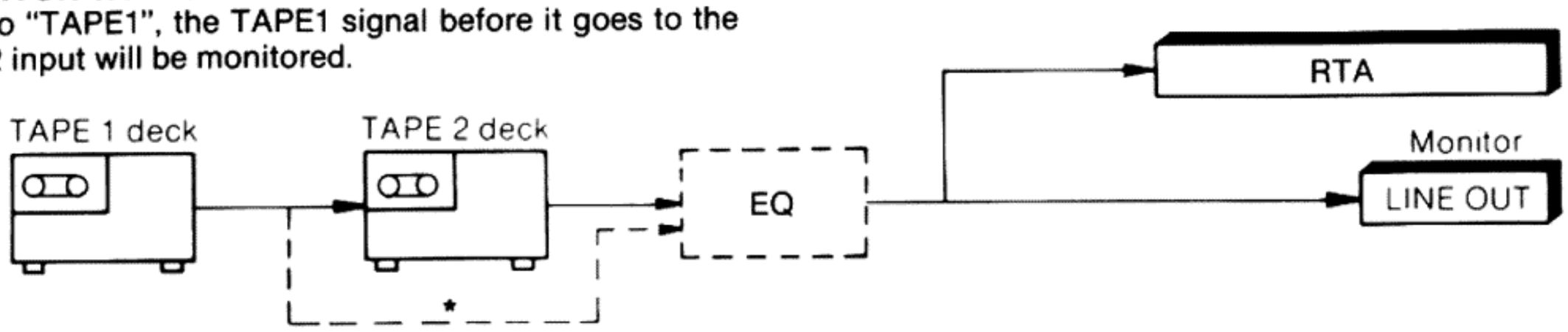
Dubbing

From TAPE 1 to TAPE 2

Playback the TAPE1 and record it on the TAPE2.

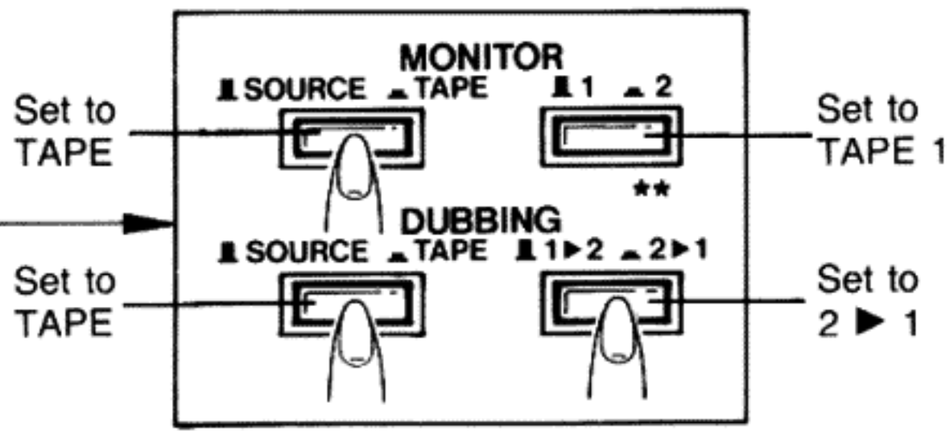


*** MONITOR TAPE1/TAPE2 button**
If set to "TAPE1", the TAPE1 signal before it goes to the TAPE2 input will be monitored.

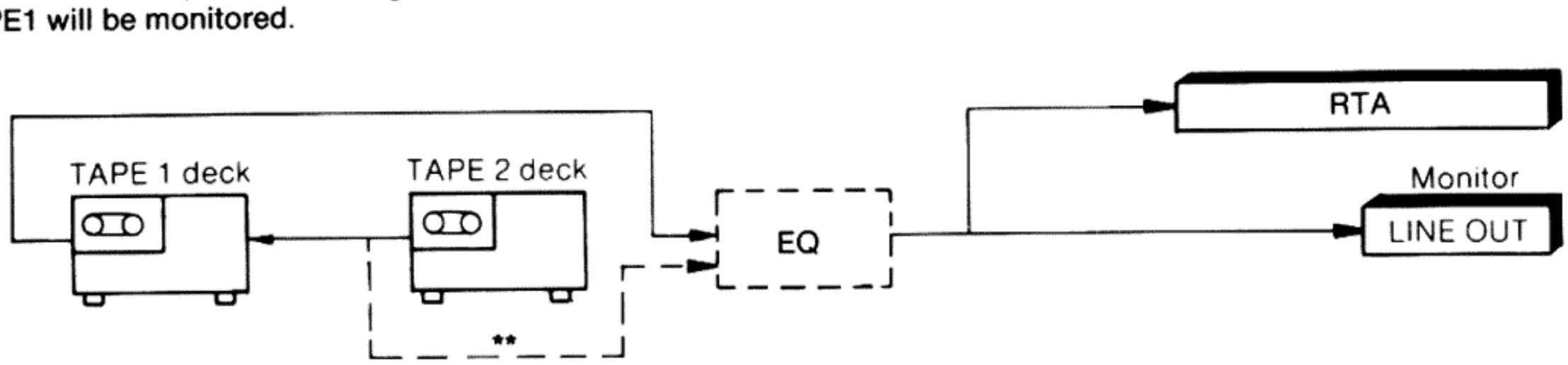


From TAPE 2 to TAPE 1

Playback the TAPE2 and record it on the TAPE1.

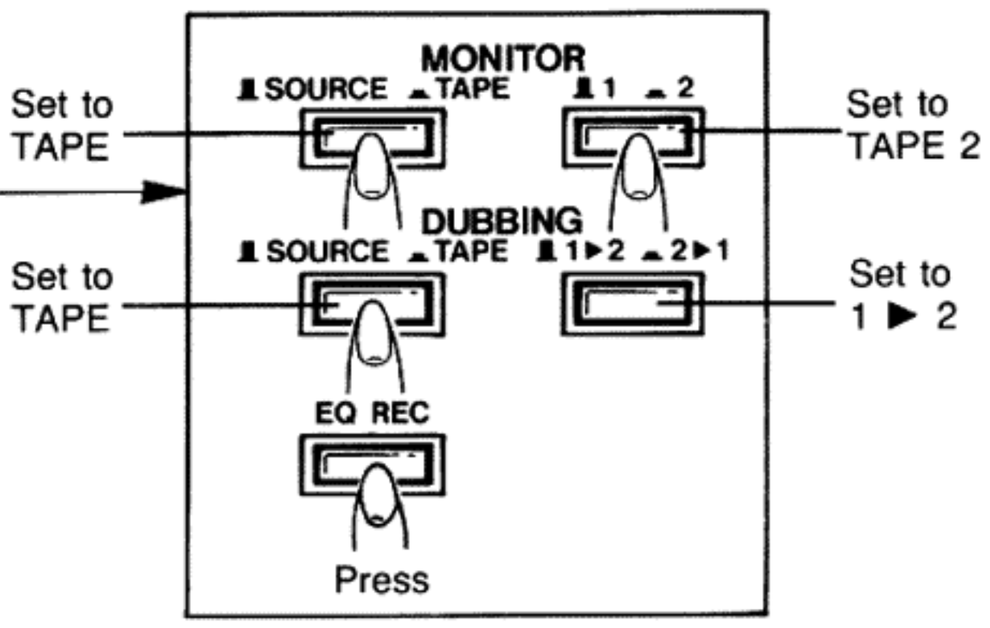


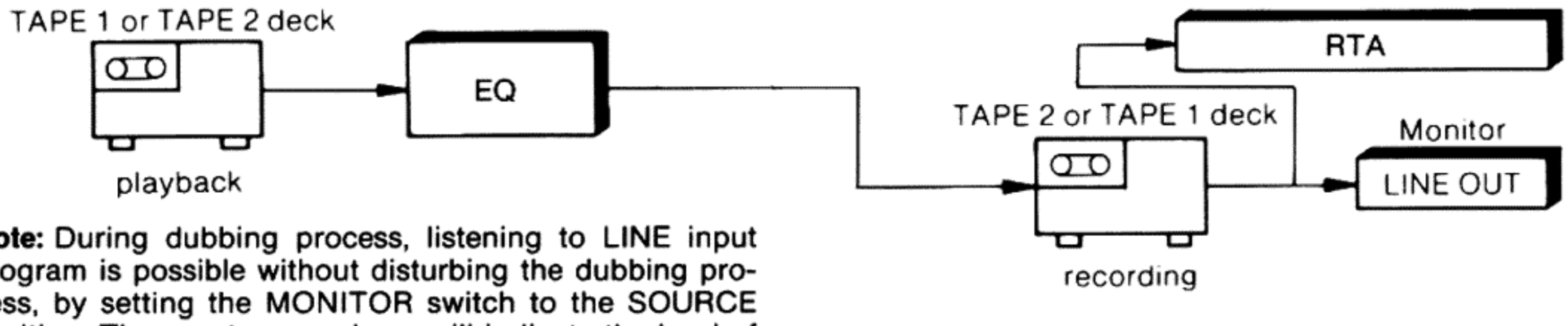
**** MONITOR TAPE1/TAPE2 button**
If set to "TAPE2", the TAPE2 signal before it goes to the TAPE1 will be monitored.



To make an equalized dubbing

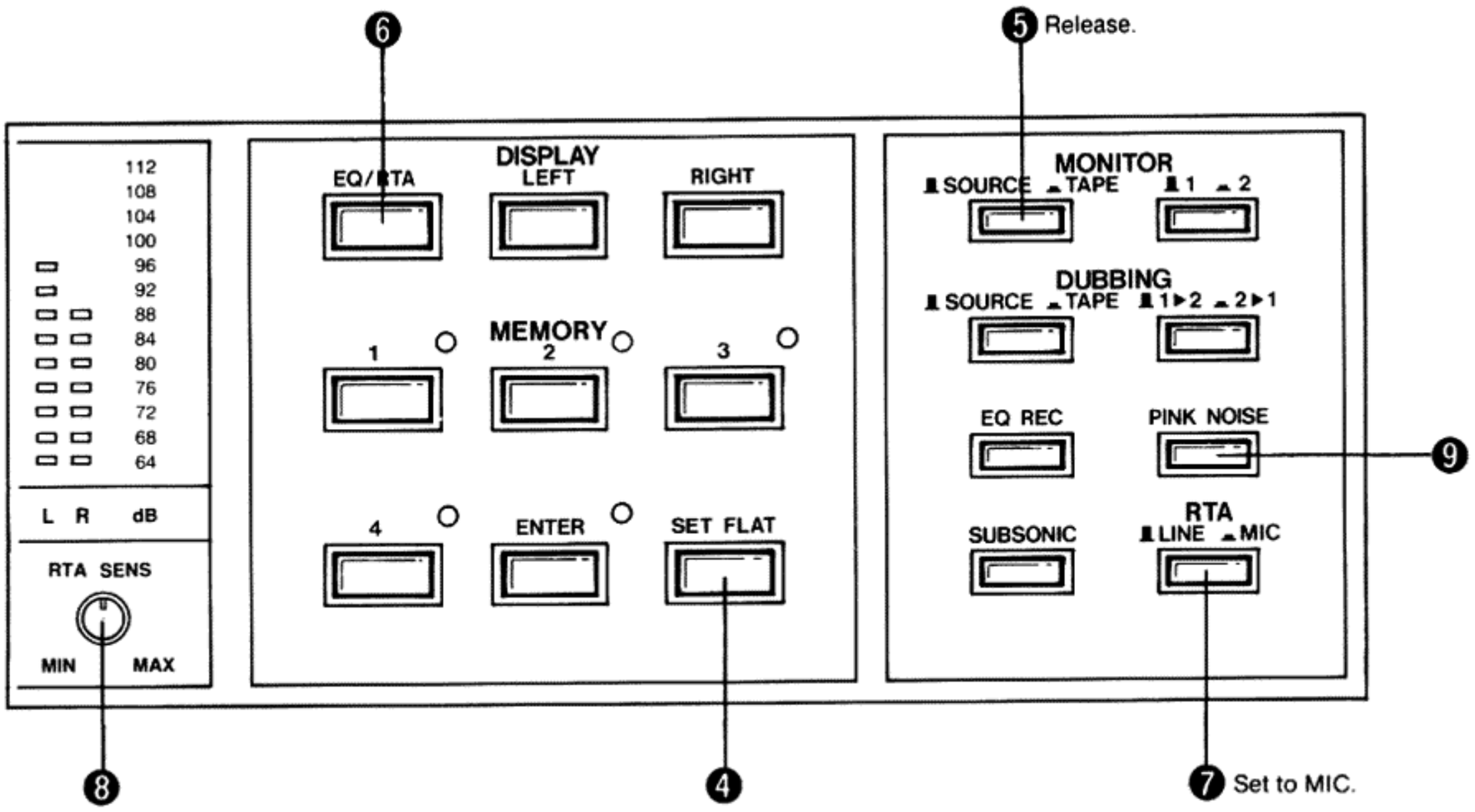
Press the EQ REC button and EQ/RTA buttons to switch the equalizer in between TAPE1 and TAPE2.





Note: During dubbing process, listening to LINE input program is possible without disturbing the dubbing process, by setting the MONITOR switch to the SOURCE position. The spectrum analyzer will indicate the level of the LINE output signals.

To Analyze the Sound Field



Using the RTA

❶ Turn your preamp's input selector or tape monitor selector to TAPE.

❷ Turn down the volume control of your preamp.

❸ Plug the microphone into the microphone jack. The microphone should be placed at a convenient location in the room. For the most accurate measurement of frequency response, the microphone should be place in a typical listening location, and the grille should be aimed at a point midway between the two loudspeakers.

❹ Press the SET FLAT button.

❺ Set the MONITOR SOURCE/TAPE switch to SOURCE.

❻ Set the EQ/RTA button to RTA.

❼ Set the LINE/MIC button to MIC.

❽ Operate the RTA SENS min/max control. The level of ambient noise is shown on the display. Note the level. Most rooms have some reading in the lowest frequencies at the most sensitive setting of the spectrum analyzer. This ambient noise reading is caused by traffic noise, air conditioners, heaters, etc.

❾ Press the PINK NOISE button to turn on pink noise.

❿ Slowly rotate the volume control of the preamp. For accurate readings, the spectrum analyzer should now indicate at least 10 dB greater level in each band than the ambient noise level previously measured.

Caution: Very high levels of pink noise (greater than 95 dBSPL) may damage speakers. Use care in setting the preamp's volume control.

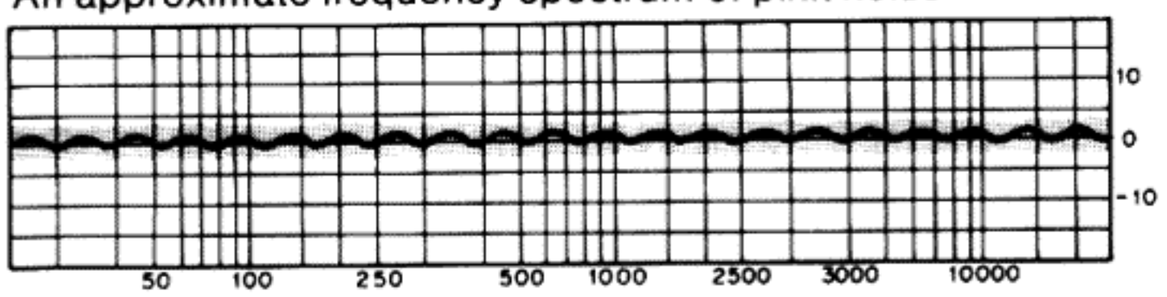
⓫ The spectrum analyzer now shows the frequency response of the sound system for that microphone location.

⓬ As the microphone is moved about the room, the effect on frequency response by room boundaries (walls, ceilings, floor, furniture, and speaker placement) can be evaluated.

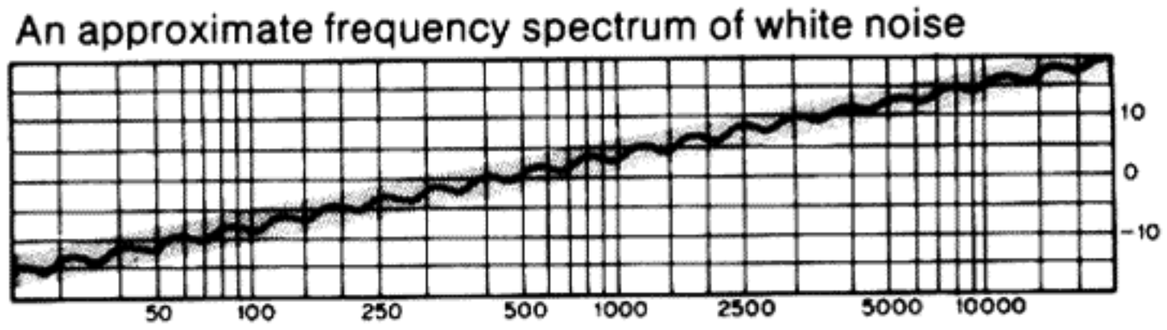
About pink noise signal

The pink noise signal consists of equal parts of each octave of the audio spectrum, like a deeper form of the white noise you hear between FM radio stations or on unoccupied TV channels: an airly rushing sound. White noise exhibits a 3dB increase per octave as the frequency is increased.

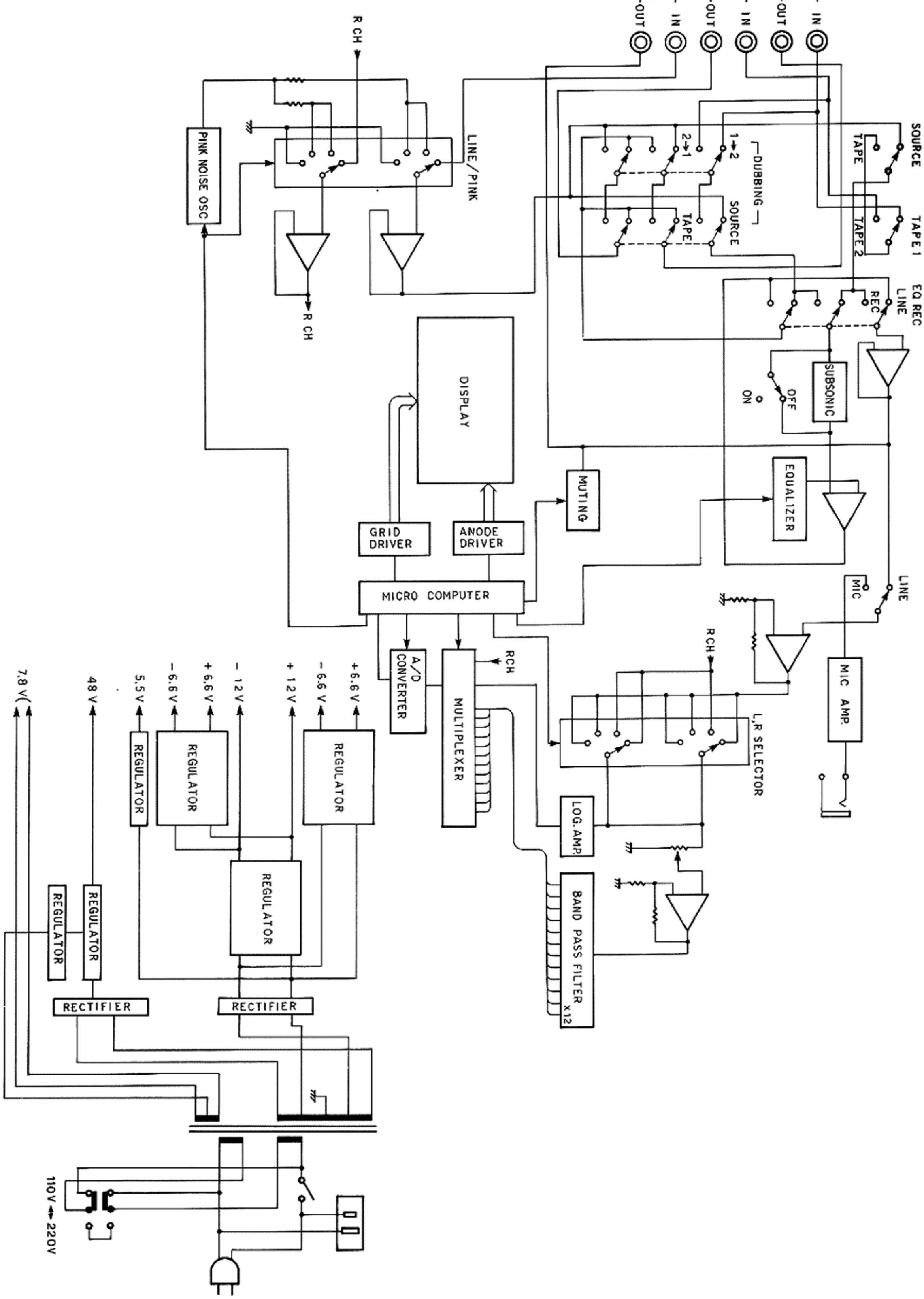
An approximate frequency spectrum of pink noise



An approximate frequency spectrum of white noise



Block Diagram



About Frequency Equalization

The front panel has 12 controls, each varying by ±12 dB the level of a small range of audio frequencies which is centered around the frequency marked over each control. In order to achieve a smooth response, controls for adjacent frequencies within each channel must interact. For example, the 500 Hz control will affect the 1 kHz control. The net effect of such controls set in the same direction (both in + or both in −) will be greater than the panel marking indicates. The effect of such controls in opposite directions (one + and one −) will be less than indicates. Refer to figures in **Total system equalization** that follow for typical slide control effect.

In EQ mode, the frequency response display provides a visual display of the controls depicting graphically the curves you have created, to assist in tailoring the frequency response to your preference.

The musical spectrum

The **Approximate frequency ranges** chart on next page correlates familiar musical instruments with the numerical frequencies that they produce. Given the often talked about musical range of 20 Hz to 20 kHz, it is surprising to see how low musical fundamentals actually are. (Almost all are under 3,500 Hz.) It should be understood however that if all instruments were perceived only by their fundamental frequency output (black bands), they would all sound alike. It is the harmonics or overtones all sound alike. It is the harmonics of overtones (grey bands) that give each individual instrument its character or timbre and set it apart from the rest.

Interestingly enough, the human ear is more sensitive to certain octaves in the musical spectrum than to others.

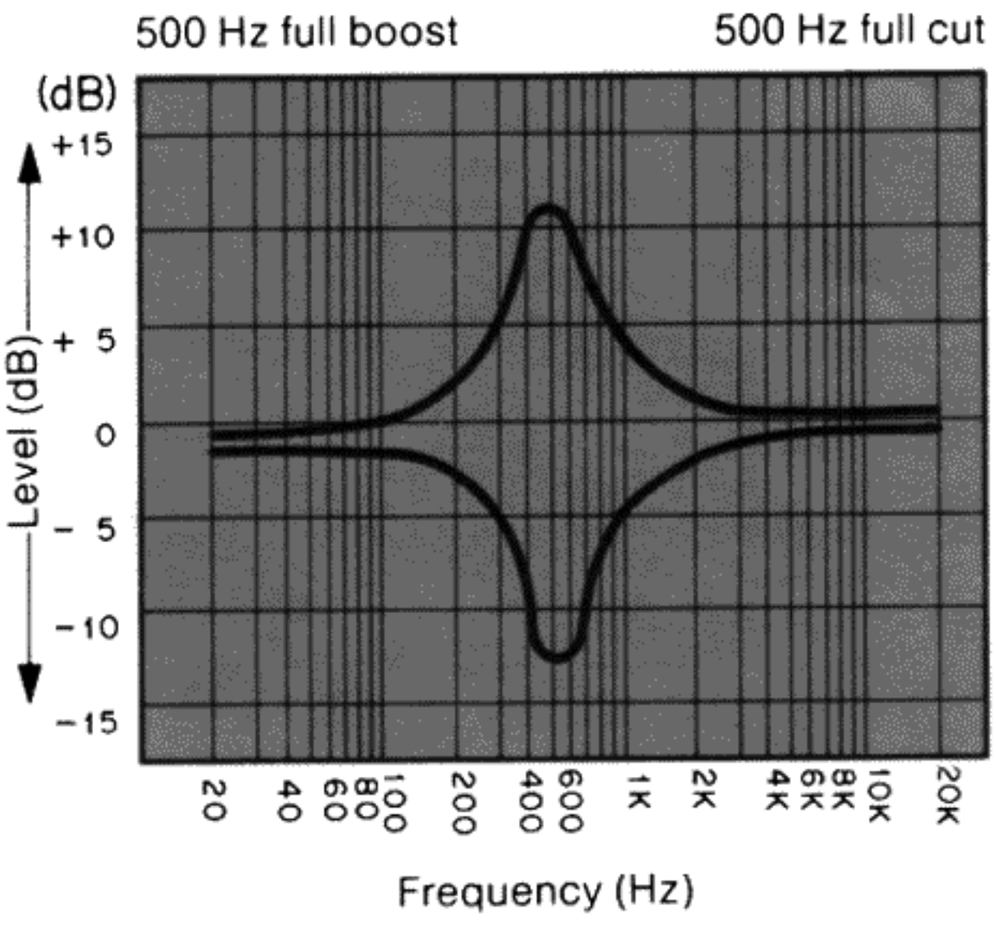
Whoever designed this engineering marvel deemed it necessary to tune the ear more toward the midrange frequencies where speech and voice communication occur than to the outer octaves of low bass and high musical overtones. As a result, very small energy changes here will cause a more drastic psychoacoustic effect than larger changes would at the frequency extremes.

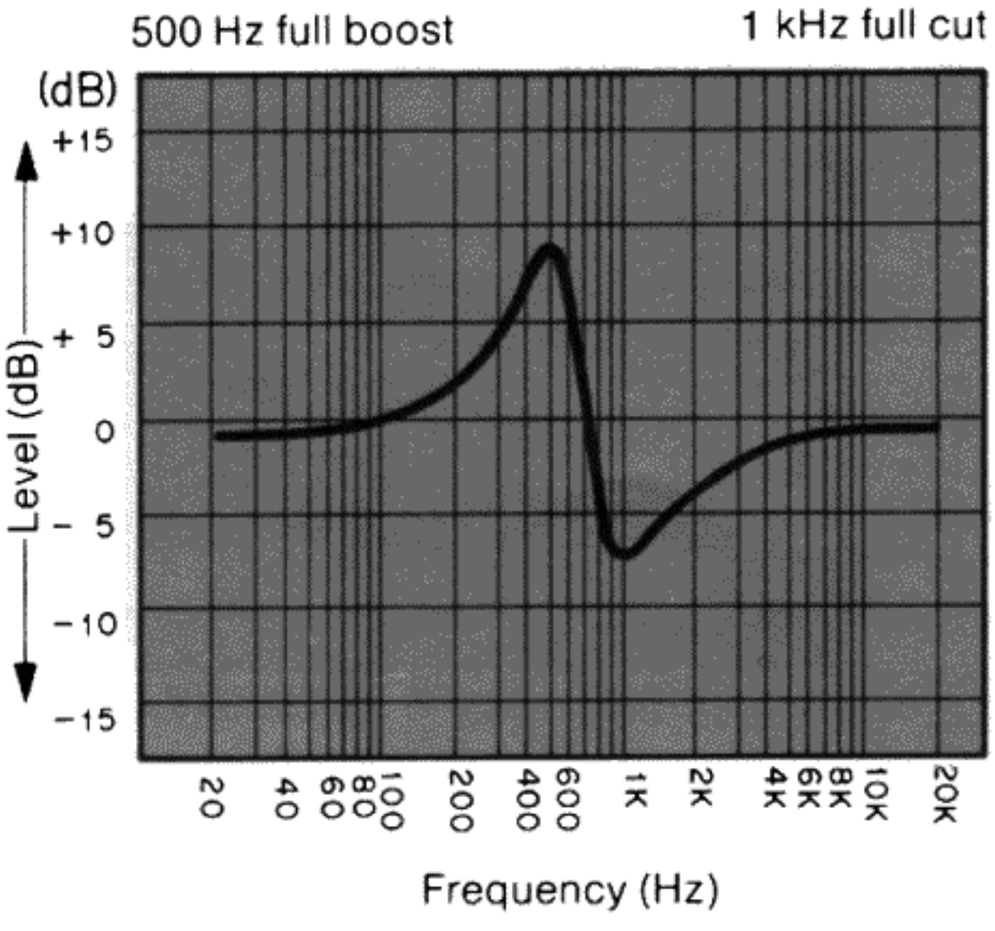
In order to discuss the qualitative effects of adjustment in tonal balance, it is best to arbitrarily divide the musical spectrum into five ranges.

The bass (approx. 20 — 140 Hz). There is little musical material with fundamental frequencies below about 60 Hz, and what is normally perceived as low bass material is actually in the 60 — 140 Hz range. The very lowest frequency controls can be used to enhance output for the few instruments in that range (organ, contrabassoon, etc.) or they can be used to reduce rumble, acoustic feedback and other low frequency aberrations. A control in what is normally labeled the 60 — 90 Hz area will usually cause the greatest perceptible changes in "bass response".

Total system equalization

Frequency response curves





The mid-bass (approx. 140 — 400 Hz). An over accentuated mid-bass region will yield a very muddy and "boomy" quality to the music A system shy of mid-bass will sound hollow and thin. Controls in this region are important for good overall balance.

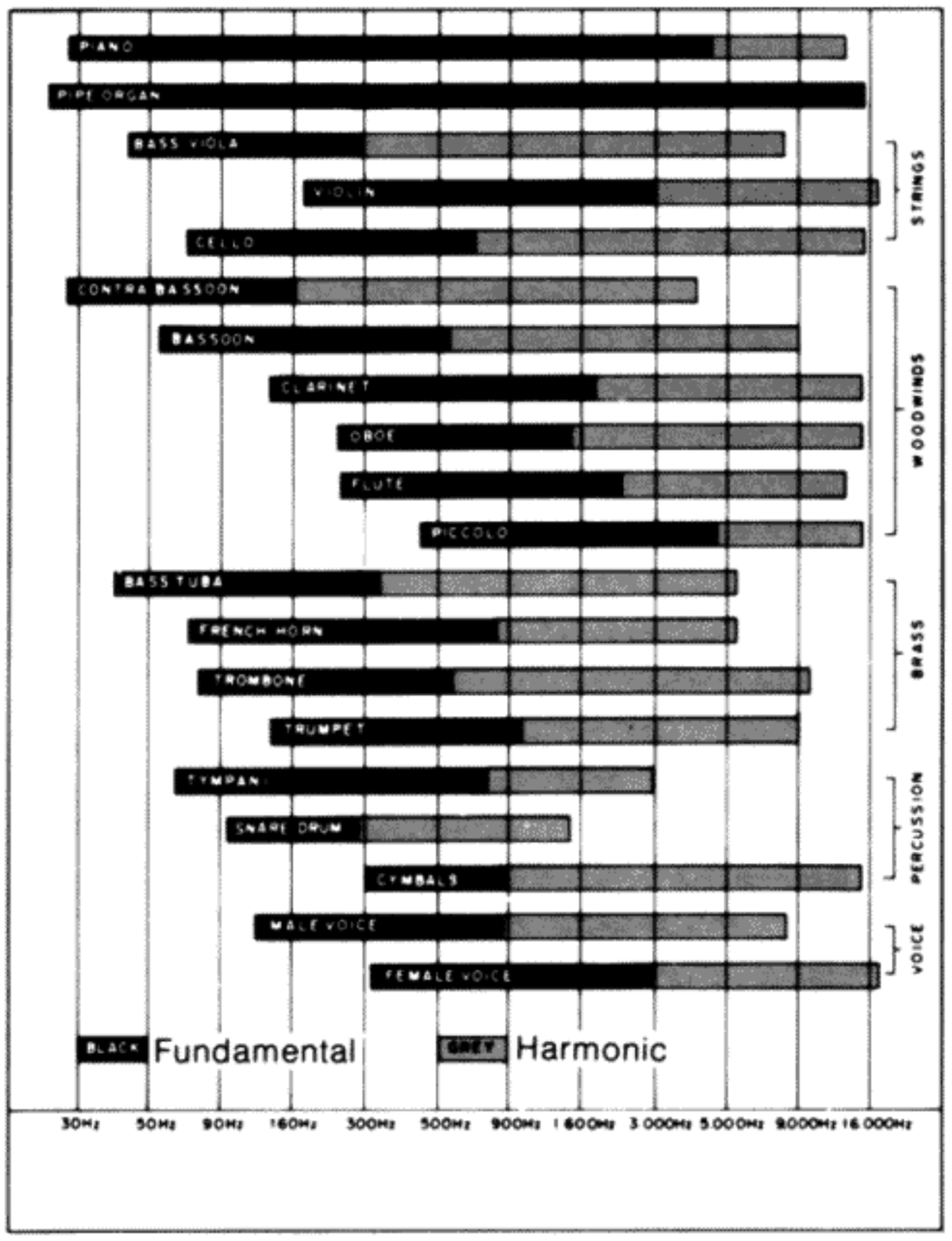
The mid-range (approx. 400 — 2,600 Hz). As the area where the ear is most sensitive to tonal balance, the midrange is important in adjusting the qualitative sonic characteristics of your system. There is controversy among engineers and audiophiles as to what the proper balance should be in this range. Moreover, you will find some settings optimum for certain types of music with other settings just right for different types.

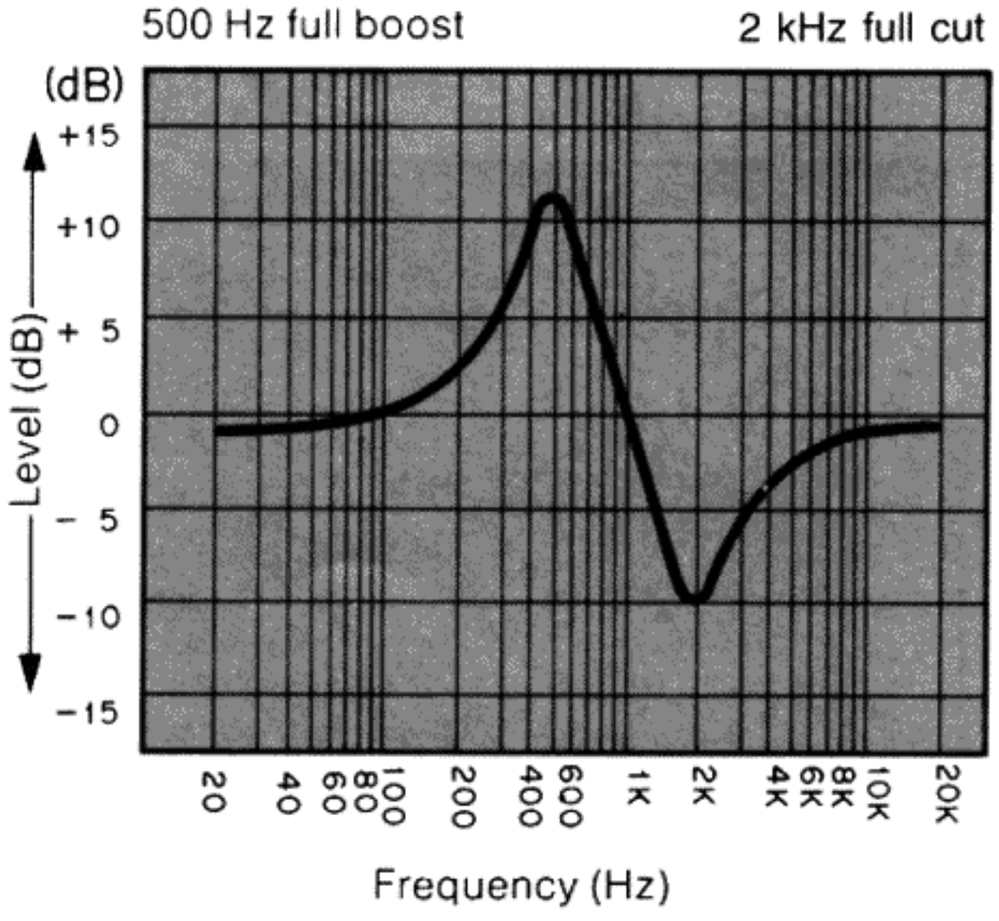
The upper mid-range (approx. 2,600 — 5,200 Hz). Speaker designers often boost output in this range to effect a quality of "presence" to the music. Too much energy, on the other hand, sounds overbearingly harsh and strident. A good balance should be achieved between this and a more muffled sound.

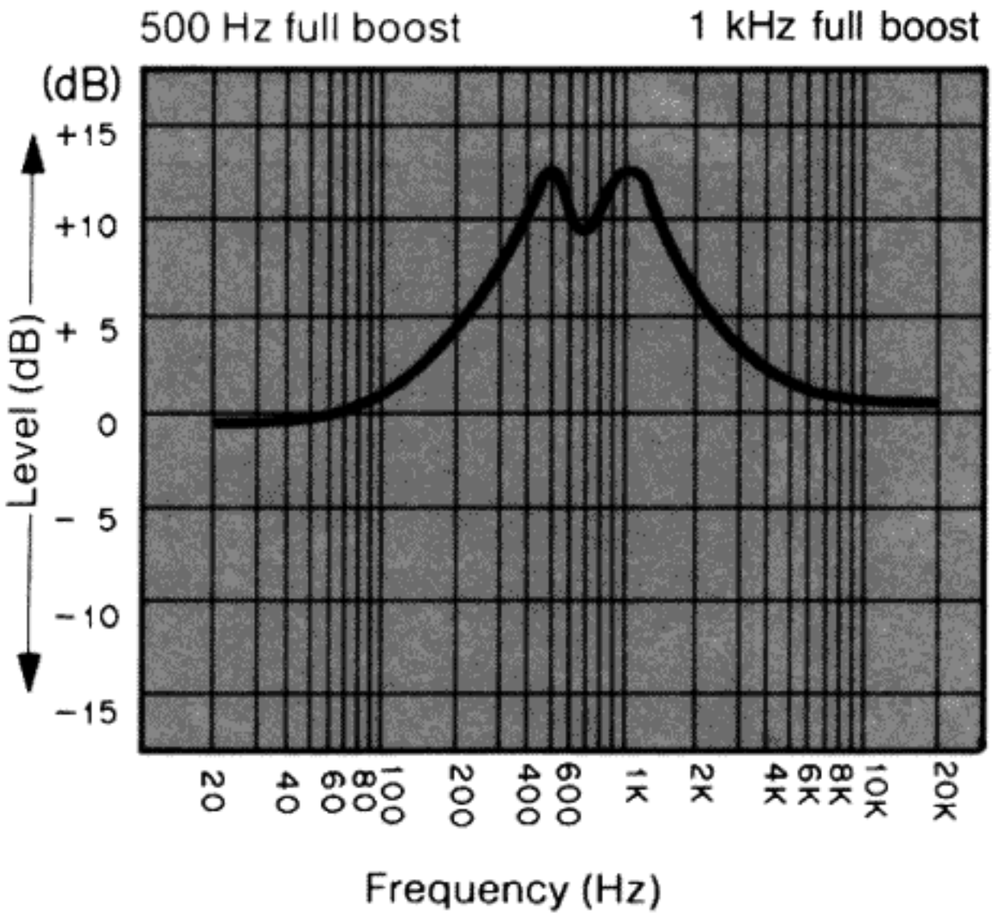
The high end (approx. 5,200 — 20,000 Hz). The region up to only about 12 kHz or so is what is normally perceived as high frequencies. Adjustment in this range affects the brilliance of music, with too much boost in energy yielding an unpleasant and piercing quality.

The last 8,000 Hz contains very little musical material. And most adults have hearing which control in the 14 — 20 kHz range will have a very subtle effect. It can be used to add a little more dimension to the sound or as very high frequency noise filter.

Approximate frequency ranges for musical instruments and voice







Specifications

Equalizer

Control range	±12 dB
Frequency response	5 to 100 kHz ±1 dB
Control frequencies	25 40 63 100 160 250 500 1k 2k 4k 8k 16k (Hz)
Gain (SET FLAT pressed)	±1 dB unity
Maximum input/output level	4V rms
Harmonic distortion over 20 Hz to 20 kHz	0.008% at 0.5V output
Intermodulation distortion, 60 Hz:7 kHz = 4:1	0.008% at 0.5V output
Hum and noise A-weighted	–100 dBV
Load impedance	10 kohm or greater
Subsonic filter	–18 dB/octave, 15 Hz
Input impedance at 1 kHz	47 kohm
Output impedance at 1 kHz	470 ohm

Analyzer

Center frequencies	25 40 63 100 160 250 50 1k 2k 4k 8k 16k (Hz)
Display accuracy	Over 16 to 1kHz, ±10% Over 2k to 20 kHz, ±5%
Frequency response from LINE IN	16 to 16 kHz, ±0.5 dB
Frequency response from cariblated MIC	25 to 16 kHz, ±3 dB
Input impedance, MIC jack	2.2 kohm (at 1 kHz)
Input sensitivity, MIC jack	200 uV
Input sensitivity, LINE IN	150 mV
Pink noise generator output	100 mV (unity gain)
Pink noise frequency response	Over 20 to 16 kHz, ±3 dB rms

Microphone

Element type	Electret condenser
Directivity	Omni-directional
Impedance, at 1 kHz	2.2 kohm
Sensitivity	0 dB = 1V/microbar, –70 dB
Bias	1.5V DC supplied by SS-325X

Microcomputer

Four frequency curve memories back-up by lithium battery. (The lithium battery will normally last about 5 years.)
SET FLAT function

Miscellaneous

Dimensions	
width	444 mm, 17-1/2"
height	94 mm, 3-3/4"
depth	238 mm, 9-3/8"
Weight	4 kgs, 9 lbs.
Power requirement	AC 100-120V/220-240V 50-60 Hz, 25W (PX version) AC 120V 60 Hz, 25W (USA and Canada version)

Designs and specifications subject to change without notice.

SAFETY INSTRUCTIONS
READ BEFORE OPERATING EQUIPMENT

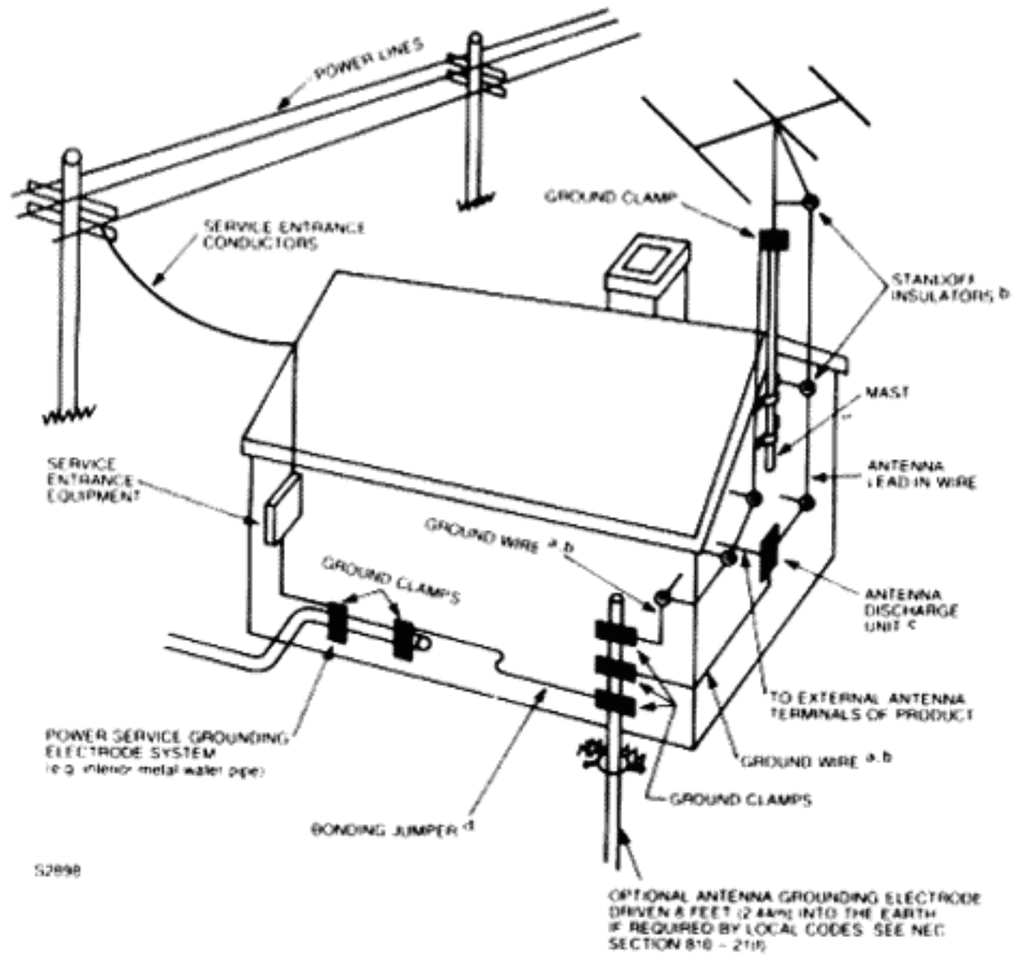
This product was designed and manufactured to meet strict quality and safety standards.
There are, however, some installation and operation precautions which you should be particularly aware of.

1. Read Instructions – All the safety and operating instructions should be read before the appliance is operated.
2. Retain Instructions – The safety and operating instructions should be retained for future reference.
3. Heed Warnings – All warnings on the appliance and in the operating instructions should be adhered to.
4. Follow Instructions – All operating and use instructions should be followed.
5. Water and Moisture – The appliance should not be used near water – for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, and the like.
6. Carts and Stands – The appliance should be used only with a cart or stand that is recommended by the manufacturer.
7. Wall or Ceiling Mounting – The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.
8. Ventilation – The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
9. Heat – The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
10. Power Sources – The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
11. Grounding or Polarization – The precautions that should be taken so that the grounding or polarization means of an appliance is not defeated.
12. Power-Cord Protection – Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

12A. Protective Attachment Plug – The appliance is equipped with an attachment plug having overload protection. This is a safety feature. See Instruction Manual for replacement or resetting of protective device. If replacement of the plug is required, be sure the service technician has used a replacement plug specified by the manufacturer that has the same overload protection as the original plug.

13. Cleaning – The appliance should be cleaned only as recommended by the manufacturer.
14. Power Lines – An outdoor antenna should be located away from power lines.
15. Outdoor Antenna Grounding – If an outside antenna is connected to the receiver, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70 – 1984, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See Figure S2898.
16. Nonuse Periods – The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
17. Object and Liquid Entry – Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
18. Damage Requiring Service – The appliance should be serviced by qualified service personnel when:
    A. The power-supply cord or the plug has been damaged; or
    B. Objects have fallen, or liquid has been spilled into the appliance; or
    C. The appliance has been exposed to rain; or
    D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
    E. The appliance has been dropped, or the enclosure damaged.
19. Servicing – The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

EXAMPLE OF ANTENNA GROUNDING ACCORDING TO NATIONAL ELECTRICAL CODE INSTRUCTIONS CONTAINED IN ARTICLE 810 – "RADIO AND TELEVISION EQUIPMENT"



a Use No. 10 AWG (5.3 mm²) copper, No. 8 AWG (8.4 mm²) aluminum, No. 17 AWG (1.0 mm²) copper-clad steel or bronze wire, or larger, as a ground wire.
b Secure antenna lead-in and ground wires to house with stand-off insulators spaced from 4–6 feet (1.22–1.83 m) apart.
c Mount antenna discharge unit as close as possible to where lead-in enters house.
d Use jumper wire not smaller than No. 6 AWG (13.3 mm²) copper, or the equivalent, when a separate antenna-grounding electrode is used. See NEC Section 810-21 (j).

Fig. S2898

NOTE TO CATV SYSTEM INSTALLER:

This reminder is provided to call the CATV system installer's attention to Article 820 – 22 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

Accessories

Your Superscope dealer has a complete line of accessories designed to aid you in your specialized recording needs.

EC-77 One-Point Bidirectional Stereo Condenser Microphone
... ideally suited for use with this model.

HP-10 Headphones
... for "private listening" in stereo.

Carrying Case
... provides protection and portability.

RBD-1 Rechargeable Ni-Cad Battery Pack
... eliminates frequent battery replacement.

DCA-6 Auto Adaptor
... allows unit to be powered by 12 volt battery in car, camper or boat.

Superscope Cassette Tape
... the finest tensilized polyester tape is used to ensure high quality recordings...plus we've added two extra minutes of recording time.

SUPERSCOPE®
INC.

20525 NORDHOFF STREET • CHATSWORTH, CALIFORNIA 91311

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